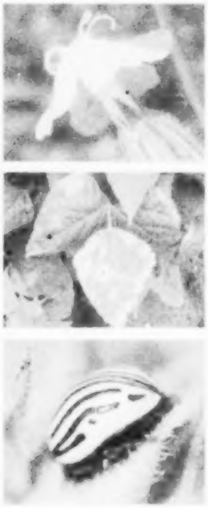
Saskatchewan
Agriculture
and Food

Introduction
Weed Control
Foliar Fungicides
Seed Treatments
Insect Control



# 2006 GUIDE TO
# Crop Protection

## SASKATCHEWAN
weeds, plant diseases, insects

This publication is only a guide.
Always refer to the product label for
application details and precautions.

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## Saskatchewan Agriculture and Food

**Spring Update:** An update to this publication is produced for May 1 each year that provides corrections and new uses that have been registered since printing. The Spring Update to the Guide to Crop Protection is available through the Agriculture Knowledge Centre, on the Saskatchewan Agriculture and Food website, or your local dealer may have copies available.

**Agriculture Knowledge Centre** **1-866-457-2377**
The Agriculture Knowledge Centre is your place to start for the latest answers on topics ranging from crops and livestock to nutrient management and the economic implications of management decisions. The toll-free line puts you in touch with resource agents and specialists who draw on expertise from around the province and beyond. The friendly staff will help you find the solutions you need for your operation.

**Crop Protection Laboratory** **(306) 787-8130**
(plant disease diagnosis, weed and insect identification, herbicide resistance screening)

The **Crop Protection Laboratory** offers a range of diagnostic services to assist in the identification of problems associated with all agricultural crops and forage. The major areas of expertise include weed, insect and plant disease identification and herbicide resistance screening.

Better background information on a diagnostic sample results in more accurate diagnosis. Therefore, a Crop Protection Laboratory submission form should be completed fully and included with the sample. A printable version of the Crop Protection Laboratory submission form and instructions on sample submission can be found on the SAF website at www.agr.gov.sk.ca. From the main menu, select "Forms" to locate the form and instructions. Otherwise, contact the Crop Protection Lab directly at the number below or the Agriculture Knowledge Centre at 1-866-457-2377.

**Fees:**

| | |
|---|---|
| Insect or weed identification | $10 |
| Visual plant disease identification | $20 |
| Cultured plant disease identification | $40 |
| Herbicide resistance screening | $35 - $100 |

**Phone:** (306) 787-8130
**E-mail:** croplab@agr.gov.sk.ca

## Cover photos

**Top:** A flower of white cockle.

**Middle:** Bacterial Blight of dry bean.

**Bottom:** Sunflower beetle resting on a sunflower bud.

**Agriculture and Agri-Food Canada**

| | |
|---|---|
| Saskatoon Research Centre | (306) 956-7200 |
| Scott Research Farm | (306) 247-2011 |
| Melfort Research Farm | (306) 752-2776 |

**Shelterbelts**

| | |
|---|---|
| PFRA Shelterbelt Centre<br>Indian Head | (306) 695-2284 |

**Pesticide Analysis**
(herbicide, fungicide or insecticide)

| | |
|---|---|
| Enviro-Test Labs<br>www.envirotest.com/ag/ | 1-800-668-9878 |

**Additional Information**
For more information on herbicides, pesticides, pesticide safety and weed, insect or plant disease control, consult the publications available from the Agriculture Knowledge Centre or visit the Saskatchewan Agriculture and Food website at **www.agr.gov.sk.ca**.

## Major Poison Control Centres

**Saskatchewan Health**
**1-866-454-1212**

| Saskatoon | Regina |
|---|---|
| Royal University Hospital | Regina General Hospital |
| **(306) 655-1010** | **(306) 766-4545** |
| **1-800-363-7474** | **1-800-667-4545** |

## Toxicology Centre

University of Saskatchewan
**(306) 966-7441**

## Spill Report

Saskatchewan Environment
**1-800-667-7525**

This publication was prepared by Saskatchewan Agriculture and Food in co-operation with Manitoba Agriculture, Food and Rural Initiatives, and with the assistance of the Joint Weed Sub-Council of the Saskatchewan Advisory Councils on Soils and Agronomy and Forage Crops.

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# TABLE OF CONTENTS

**1. Introduction** ........ **9**
How to Use This Book ........ 9
Product Labels and PCP Numbers ........ 9
Safe Use of Herbicides, Fungicides and Insecticides ........ 10
Protecting Yourself from Exposure to Herbicides, Fungicides, and Insecticides ........ 10
Protective Clothing ........ 11
Protecting Your Eyes, Face and Lungs ........ 12
Avoiding Spray Drift ........ 12
Herbicide Efficacy With Low-drift Nozzles ........ 13
Handling a Drift Complaint ........ 13
Mixing Pesticides ........ 13
Container Disposal ........ 14
Sprayer Tank Cleaning ........ 14
How to Identify Crop and Weed Leaf Stages ........ 16

**2. Weed Control** ........ **19**
Integrated Weed Management ........ 19
Making Spray Decisions ........ 19
Weed Resistance to Herbicides ........ 27
Surfactants and Herbicide Registrations ........ 31
Oil-based Adjuvants and Herbicide Registrations ........ 31
Adjuvants and Your Herbicide ........ 32
Crop and Herbicide Recommendation Tables ........ 32
Weed Control Tables ........ 33
Herbicide Formulations and Companies ........ 44
Products Available as Prepackaged Tank Mixes ........ 46
Herbicide Directory ........ 47
Special Weed Problems ........ 219
Soil Residual Herbicides ........ 224
Effect of Rainfall on Herbicide Efficacy ........ 226

**3. Plant Disease Control** ........ **227**
Integrated Plant Disease Management ........ 227
Resistance Management ........ 229
Foliar Fungicide Directory ........ 231
Seed Treatment Directory ........ 260

**4. Insect Control** ........................................................ **297**
Insect Control Decisions ........................................................ 297
Field Scouting ........................................................ 297
Field Scouting and Insect Management Charts (for individual crops) ........................................................ 297
Insecticides and Bees ........................................................ 297
Insecticide Poisoning in Humans ........................................................ 333
Resistance of Insects to Insecticides ........................................................ 333
Insecticide Directory ........................................................ 335
Insect Control in Stored Grain ........................................................ 363

**Reference Material**
Pesticide Index ........................................................ 5
Crop Protection Companies ........................................................ Inside Cover
Emergency Numbers ........................................................ Inside Cover
Agricultural Offices ........................................................ Inside Cover
Metric Conversion Factors ........................................................ 7
Tank Mix Chart - Recommended Herbicides ........................................................ Insert, Inside Back Cover
Forage Crops Chart - Recommended Herbicides ........................................................ Insert, Inside Back Cover

# Pesticide Index

## Herbicide Directory

a – for use in annual crops
f – for use in forages

2,4-D (a,f) ... 47
2,4-DB (a,f) ... 49
Absolute (a) ... 51
Accent (a) ... 52
Achieve Liquid (a,f) ... 54
Achieve Liquid Gold (a) ... 56
Adrenalin/Adrenalin SC (a) ... 57
Advance (see ‘Trifluralin’) ... 202
Ally Toss-N-Go (a,f) ... 59
Amitrol 240 (a,f) ... 61
Approve (see ‘Bromoxynil + 2,4-D ester’) ... 80
Assert 300 SC (a,f) ... 63
Assure II (a,f) ... 65
Atrazine (a) ... 66
Attain (a) ... 68
Avadex BW/Avadex MicroActiv (a,f) ... 70
Avenge 200 C (a,f) ... 73
Badge (see ‘Bromoxynil + MCPA ester’) ... 81
Banvel II (see ‘dicamba’) (a,f) ... 89
Basagran/Basagran Forté (a,f) ... 75
Bonanza (see ‘Trifluralin’) ... 202
Bromoxynil (a,f) ... 78
Bromoxynil + 2,4-D ester (a) ... 80
Bromoxynil + MCPA ester (a,f) ... 81
Buctril M (see ‘Bromoxynil + MCPA ester’) ... 81
Caliber 400, 625 (see ‘2,4-DB’) ... 49
Casoron ... 84
Centurion (see ‘Clethodim’) ... 85
Clethodim (a,f) ... 85
Clovitox Plus (see ‘MCPB + MCPA’) ... 155
Cobutox 600, 625 (see ‘2,4-DB’) ... 49
Compitox (see ‘Mecoprop’) ... 156
Credit (see ‘Glyphosate’) ... 123
Curtail M (a,f) ... 87
Dicamba (a,f) ... 89
Dicamba + mecoprop + MCPA (a,f) ... 91
Dichlorprop + 2,4-D (a) ... 93
Dichlorprop-D (see ‘Dichlorprop + 2,4-D’) ... 93
Dual II Magnum (a) ... 95
DyVel (a) ... 96
DyVel DSp (a,f) ... 97
Eclipse (a) ... 100
Edge (a,f) ... 101
Elite (a) ... 102
Embutox 625 (see ‘2,4-DB) ... 49
Eptam 8-E (a) ... 103
Eradicane 8-E (a) ... 105
Escort (f) ... 106
Estaprop (see ‘Dichlorprop + 2,4-D’) ... 93
Everest (a) ... 108
Express Pack (a) ... 110
Express TNG ... 112
Factor (see’ Glyphosate’) ... 123
FlaxMax Ultra (a) ... 113
Fortress ... 114
Frontier (a) ... 116
Frontline (a) ... 119
Frontline 2,4-D (a) ... 118
Fusion (a) ... 121
Glyfos (see ‘Glyphosate’) ... 123
Glyphosate (a,f) ... 123
Gramoxone (a) ... 133
Grazon (f) ... 134
Harmony Total (a) ... 135
Horizon (a) ... 136
Horizon BTM (a) ... 138
K2 (a) ... 139
Kerb 50-WSP (f) ... 140
Koril 235 (see ‘Bromoxynil’) ... 78
Laddok (a) ... 142
Liberty (a) ... 143
Liberty 200 SN (a) ... 146
Linuron (a) ... 147
Lontrel (a,f) ... 150
Lorox DF (see ‘Linuron’) ... 147
Maverick (see ‘Glyphosate’) ... 123
MCPA (a,f) ... 152
MCPB + MCPA (a,f) ... 155
Mecoprop (a) ... 156
Mextrol 400 and 450 M (see ‘Bromoxynil + MCPA ester’) ... 81
Muster Gold II (a) ... 157
Muster Toss-N-Go (a) ... 158
Odyssey (a,f) ... 160
Odyssey DLX ... 161
Option 35 DF ... 163
Oracle (see ‘Dicamba’) ... 89
Pardner (see ‘Bromoxynil’) ... 78
Pinnacle (a) ... 165
Poast Ultra (a,f) ... 166
PrePass (a) ... 168
Prestige (a,f) ... 170
Prevail Liquid (a) ... 171
Primextra II Magnum (a) ... 172
Princep Nine-T (see ‘Simazine’) ... 194
Prism (a) ... 174
Puma$^{120}$ Super (a) ... 175
Pursuit (a,f) ... 177
Pursuit Ultra (a) ... 179
Refine Extra Toss-N-Go (a,f) ... 180
Refine M ... 182
Reflex (a) ... 183
Reglone Desiccant (a) ... 184
Remedy EC (f) ... 186
Renegade (see ‘Glyphosate’) ... 123
Reward (a) ... 187
Rival (see ‘Trifluralin’) ... 202
Roundup brand products (Dry, Original, Transorb, Ultra, WeatherMax) (see ‘Glyphosate’) ... 123
Rustler (a) ... 188

Select (see 'Clethodim') .....85
Sencor (a) .....189
Shotgun (a) .....192
Simazine 480 (see 'Simazine') .....194
Simazine (a,f) .....194
Solo .....195
Spectrum (a) .....196
Sundance (a) .....198
Sword (see 'Dicamba + Mecoprop + MCPA') .....91
Target (see 'Dicamba + Mecoprop + MCPA') .....91
Thumper (see 'Bromoxynil + 2,4-D ester') .....80
Topside (See 'MCPB + MCPA') .....155
Tordon 22K (f) .....200
Touchdown iQ (see 'Glyphosate') .....123
Treflan (see 'Trifluralin') .....202
Trifluralin (Fallow before wheat) (a) .....202
Trifluralin (Foxtail control in cereals) (a) .....204
Trifluralin (Broadleaf and grassy weed control) (a,f) .....206
Triton C .....209
Trophy (a) .....211
Tropotox Plus (see 'MCPB + MCPA') .....155
Turboprop 600 (see 'Dichlorprop + 2,4-D') .....93
Ultim (a) .....212
Unity (a) .....214
Vantage/Vantage Plus (see 'Glyphosate') .....123
Velpar DF (a) .....216
Venture L (a,f) .....217

## Foliar Fungicide Directory

Acrobat MZ .....233
Acrobat 50WP .....233
Allegro 500F .....234
Bravo 500 .....235
Bumper 418EC (see 'Propiconazole-based Fungicides') .....248
Copper 53W (see 'Copper-based Fungicides') .....236
Copper Spray (see 'Copper-based Fungicides') .....236
Copper-based Fungicides .....236
Curzate 60 DF .....238
Dithane DG Rainshield NT (see 'Mancozeb-based Fungicides') .....246
Gavel 75 DF .....239
Headline .....240
Kocide DF (see 'Copper-based Fungicides') .....236
Kocide 101 (see 'Copper-based Fungicides') .....236
Kocide 2000 (see 'Copper-based Fungicides') .....236
Kumulus DF .....243
Lance .....244
Mancozeb-based Fungicides .....246
Manzate DF (see 'Mancozeb-based Fungicides') .....246
Parasol Flowable (see 'Copper-based Fungicides') .....236
Parasol WP (see 'Copper-based Fungicides') .....236
Penncozeb 75 DF (see 'Mancozeb-based Fungicides') .....246
Polyram DF .....247
Propiconazole-based Fungicides .....248
Quadris .....250
Reason 500SC .....251
Ridomil Gold / Bravo .....252
Ronilan EG .....253
Rovral Flo .....254
Senator 70WP .....255
Stratego 250 EC .....256
Tanos 50 DF .....257
Tattoo C .....258
Tilt 250E (see 'Propiconazole-based Fungicides') .....248

## Seed Treatment Directory

Agrox B-2 .....261
Agrox CD (see 'Agrox B-2') .....261
Admire SPT (see 'Imidacloprid-based Insecticides') .....280
Allegiance FL (see 'Apron FL') .....262
Apron FL .....262
Apron Maxx RTA .....264
Baytan 30 .....265
Captan Flowable .....266
Charter .....267
Crown .....268
Cruiser 5FS .....270
Cruiser 350FS (see 'Cruiser 5FS') .....270
DB-Red L .....271
DCT .....272
Dividend XL RTA .....273
Foundation Lite .....275
Gaucho CS FL .....276
Gaucho 480 FL (see 'Gaucho CS FL') .....276
Gemini .....277
Genesis 240 (see 'Imidacloprid-based Insecticides') .....280
Helix .....279
Helix XTra (see 'Helix') .....279
Imidacloprid-based Insecticides .....280
Manco Plus (see 'Mancozeb-based Fungicides') .....281
Mancozeb-based Fungicides .....281
Maxim 480 FS .....282
Maxim PSP .....283
Mertect SC .....284
Polyram 16D .....285
Potato ST 16 (see 'Mancozeb-based Fungicides') .....281
Poncho 600 FS (see 'Prosper FL') .....286
Prosper FL .....286
Raxil 250 FL .....287
Raxil T .....289
Senator PSPT .....291
Thiram 75WP .....292
Tuberseal (see 'Mancozeb-based Fungicides') .....281
Vitaflo 280 .....293
Vitavax rs Fungicide .....295
Vitavax Single Solution .....296

## Insecticide Directory

Admire....335
Assail....336
Chlorpyrifos (see 'Lorsban')....349
Cygon....337
Decis....338
Diazinon....340
Dibrom....341
Dipel 2X DF....342
Eco Bran....343
Entrust 80 W....344
Fulfill 50WG....345
Furadan....346
Imidan....347
Insecto (see 'Protect-it')....364
Lagon (see 'Cygon')....349
Lannate....348
Lorsban....349
Malathion....351
Malathion Grain Protectant Dust....365
Matador....352
Monitor....354
Nufos (see 'Lorsban')....349
Orthene....355
Phostoxin....364
Pounce....356
Protect-It....364
Pyrinex (see 'Lorsban')....349
Ripcord....357
Sevin XLR / Sevin XLR Plus....358
Success 480 SC....359
Tempo 20 WP....365
Thimet....360
Thiodan....361
Thionex (See 'Thiodan')....361
Vydate L....362

**Table 1: Metric Conversion Factors* (Approximate)**

| *Metric Unit* | *Metric to Imperial Multiply By* | *Imperial Unit* | *Imperial to Metric Multiply By* | *Metric Unit* |
|---|---|---|---|---|
| **LINEAR** | | | | **LINEAR** |
| centimetre (cm) | x 0.39 | inch | x 2.54 | centimetre (cm) |
| **AREA** | | | | **AREA** |
| square metre (m²) | x 1.2 | square yard | x 0.84 | square metre (m²) |
| hectare (ha) | x 2.5 | acres | x 0.4 | hectare (ha) |
| **VOLUME** | | | | **VOLUME** |
| litre (L) | x 0.22 | gallon | x 4.55 | litre |
| **PRESSURE** | | | | **PRESSURE** |
| kilopascals (kPa) | x 0.14 | psi | x 6.9 | kilopascals (kPa) |
| **WEIGHT** | | | | **WEIGHT** |
| gram (g) | x 0.04 | oz | x 28.35 | gram (g) |
| kilogram (kg) | x 2.2 | lb | x 0.454 | kilogram (kg) |
| **AGRICULTURAL** | | | | **AGRICULTURAL** |
| litres per hectare (L/ha) | x 0.089 | gallons per acre | x 11.23 | litres per hectare (L/ha) |
| litres per hectare (L/ha) | x 0.357 | quarts per acre | x 2.81 | litres per hectare (L/ha) |
| litres per hectare (L/ha) | x 0.71 | pints per acre | x 1.41 | litres per hectare (L/ha) |
| millilitres per hectare (mL/ha) | x 0.014 | fl.oz per acre | x 70.22 | millilitres per hectare (mL/ha) |
| kilograms per hectare (kg/ha) | x 0.89 | lb per acre | x 1.12 | kilograms per hectare (kg/ha) |
| grams per hectare (g/ha) | x 0.014 | oz per acre | x 70 | grams per hectare (g/ha) |

*EXAMPLE: To convert centimetres to inches, multiply by 0.39; conversely, to convert inches to centimetres, multiply by 2.54. CAUTION: Herbicide labels are in metric units only. Conversion between the Metric and Imperial system may result in confusion. It is recommended to use metric units only.

# Guide to Crop Protection 2006

For Reference Until December 31, 2006
This publication is updated annually and replaces
the 2005 and previous issues.

# Introduction

## How to Use This Book

This publication is only a guide. Always refer to the product label for application details and precautions.

The *Guide to Crop Protection* is divided into three sections: (1) Weed Control; (2) Plant Disease Control; and (3) Insect Control.

To use the information in each of these sections, use the following process:

1. Turn to the charts at the beginning of each section. There is a set of charts for weeds, plant diseases and insect control. Select the chart for the crop you want or plan to grow. Use the chart to match your weed, disease or insect problems with the products available for that crop.
2. Once you have narrowed your product choices down to a few candidates, go to the recommendation section for that product. Products are listed alphabetically. Read the recommendations thoroughly for each product you are considering.
3. Read the product label attached to the container for detailed instructions on application.

This publication is intended to be used as a guide only. Information contained herein is that available at time of printing. While every effort has been made to ensure accuracy, the provincial government does not accept responsibility for label changes. When more than one trade name is listed, not all weeds or tank mixes may appear on all labels. Consult product labels attached to pesticide containers for final detailed instructions.

Certain recommendations in this publication are given in quantity of commercial product per acre (mL, L, g or kg/acre). Product labels are given in quantity of product per hectare (mL, L, g or kg/ha). To avoid application errors be sure to read and understand label recommendations.

The *Guide to Crop Protection* includes the most recent recommendations for weed, plant disease and insect control in field and forage crops. These recommendations are based on the uses registered under the Pest Management Regulatory Agency's *Pest Control Products Act*. It is an offence under *The Pest Control Products Act* to apply any chemical in a manner not consistent with the product label. If you have any doubts regarding the instructions in this publication, or on the product label, contact the company representative, your local agricultural office or the Pest Management Regulatory Agency for further advice.

## Product Labels and PCP Numbers

On each Product Page you will see a PCP number, so named because it is mandated by the *Pest Control Products Act*. Under the Act, every pesticide requires a unique identifier – the product's PCP number. That number must also appear on the product's label.

***The pesticide label packaged with the product*** is the authoritative source of information on use of the product and will contain more detailed information than is included in this Guide. Some products have a number of trade names for the same active ingredient. However, each product will have its own PCP number and these appear next to the registrants' names. Users who are seeking more detailed information than is provided in this guide, prior to purchase, can use the PCP number to access a sample product label online through the Pest Management Regulatory Agency's (PMRA) website or they can contact the PMRA Hotline by phone at 1-800-267-6315.

Use this link – http://www.eddenet.pmra-arla.gc.ca/4.0/4.01.asp – to access the Electronic Label: Search and Evaluation (ELSE) site and instructions on how to find labels. The PMRA – ELSE label database can be searched by a product's trade name, active ingredient, company name or registration (PCP) number. Since several products can contain the same active ingredient and there are often several versions of the same label on this database, using the PCP number is the most direct route to finding the label that links to the product page in this Guide. ***There may be some differences between a label found on the package and the sample labels found on the PMRA-ELSE web site so always refer to the packaged product label when applying the product.***

Once the product is located, you may click on its number to view an Adobe Acrobat (PDF) document containing the label and any supplemental registrations. Some of these documents run to many pages but you can use the 'Find' capabilities of the Acrobat Reader plug-in for your browser to jump to specific areas of interest. If you do not have Adobe Acrobat Reader installed on your computer you can download a free version from www.adobe.com

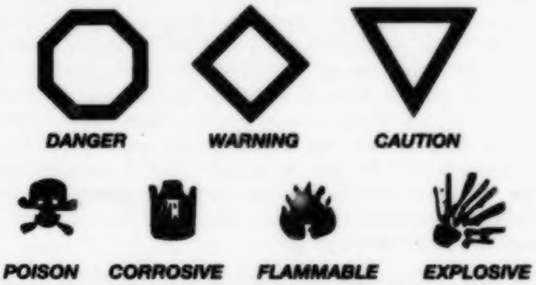
## Safe Use of Herbicides, Fungicides and Insecticides

Herbicides, fungicides and insecticides are classified according to the use hazard and risk involved. The categories of hazard are:

- toxicity
- flammability
- explosive potential
- corrosivity

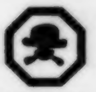
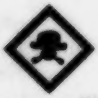
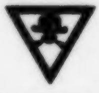
The degree of risk is represented by symbols taken from common traffic sign shapes represented by the stop, caution and yield signs. The signal word for each of the signs is danger (high risk), warning (moderate risk) and caution (low risk). Where the risk is minimal, no designation is required. The label on the container will carry the appropriate signs for the protection of the user. Degree of risk symbols for herbicides, insecticides and fungicides used in field and forage crops are included in the product directory. The symbols are illustrated in Figure 1.

**Figure 1. Degree of Risk and Hazard Symbols**



LD$_{50}$ values are used to rate the toxicity of pesticides. The LD$_{50}$ refers to the dose of pesticide (in mg per kg of the test animal's body weight) that is lethal to 50 percent of the group of test animals. For example, if a pesticide has an LD$_{50}$ value of 10 mg/kg, and the test animals each weigh 1 kg, then 50 percent of the animals would die if they each ate 10 mg of the pesticide.

**Table 2. Oral LD$_{50}$ Values as they relate to the Risk/Hazard Symbols**

| | |
|---|---|
|  |  |
| ***DANGER POISON***<br>LD$_{50}$ less than 500 mg/kg<br>indicates high toxicity | ***WARNING POISON***<br>LD$_{50}$ 500-1,000 mg/kg<br>indicates moderate toxicity |
|  | |
| ***CAUTION POISON***<br>LD$_{50}$ 1,000-2,500 mg/kg<br>mg/kg<br>indicates low toxicity | ***SYMBOL ABSENT***<br>LD$_{50}$ greater than 2,500<br>indicates very low toxicity |

Different types of protective equipment are required for pesticides that differ in toxicity. Special equipment requirements are described on the product label, but in general the following precautions must be taken when using pesticides of different hazard ratings.

**Danger Poison** - requires goggles, respirator, gloves and skin protection, avoid fumes and spray mist.

**Warning Poison** - requires goggles, gloves and skin protection, avoid fumes and spray mist.

**Caution Poison** - requires gloves and skin protection, avoid fumes and spray mist.

The absence of a hazard symbol on a pesticide label indicates low toxicity to mammals. Nevertheless, protective clothing should be worn when using pesticides that do not have a hazard symbol.

## Protecting Yourself from Exposure to Herbicides, Fungicides and Insecticides

The use of protective equipment and sound safety procedures will help minimize your exposure to herbicides, fungicides and insecticides. Follow the 10 rules for safe application listed below, and wear the safety equipment recommended.

### 10 Rules for Safe Application

1. Never smoke or eat while applying pesticides.
2. Avoid inhaling sprays or dusts. Wear protective clothing and a respirator.
3. Sprayer lines carrying chemicals should not enter the operator's cab.
4. Have soap, water and a towel available. Should concentrated product spill on skin, hands, face or eyes, wash immediately.
5. Wash hands and face when leaving the treated area, before break periods, lunch or urination.

6. Bathe or shower and change into clean clothing after working with pesticides. Wash clothing each day before re-use.
7. Call a physician or get the patient to a hospital immediately if symptoms of illness occur during or shortly after pesticide application. Be sure to take along the product label or container.
8. Store pesticides out of reach of children and where there is no chance of contact with human food or livestock feeds. Do not store herbicides with insecticides and avoid cross-contamination. Storage areas should be locked.
9. Keep chemicals in their original containers, never in unmarked containers or bottles used for food or drink.
10. Follow proper container disposal methods. All containers should be triple rinsed or pressure rinsed, punctured to render the container non-reusable, and delivered to designated disposal sites.

## Protective Clothing

Wear protective equipment as described in the chart to reduce exposure.

| EQUIPMENT | PROTECTION | HOW TO WEAR IT |
|---|---|---|
| Coveralls | There are two types of coveralls: disposable and reusable.<br>Disposable coveralls are lightweight and comfortable on warm days. They can be worn for mixing and applying pesticides, then discarded at the day's end. If they become contaminated, they should be discarded at once.<br>The second type of coverall is made of washable fabric and may be reused many times. These fabric coveralls are adequate for use with all but the most highly toxic and concentrated pesticides. | Button (or zip) right up to the neck. Loose coveralls around the neck will suck and blow pesticide in and out of the interior of the coveralls as you bend and move.<br>Wear coveralls over a long-sleeved shirt and pants. |
| Aprons | When pouring or otherwise handling concentrated pesticides, it makes good sense to wear protection in the form of an apron. The apron protects the front of your body from spills or splashes of the concentrate. The apron should be made of rubber or synthetic liquid-proof material that will resist the solvents used in formulating the pesticide. | Make sure the apron covers your body from your chest to your boots. |
| Gloves | Protect your hands by wearing chemical-resistant gloves. Neoprene gloves provide the best protection. Natural rubber gloves may be used when handling organo-phosphorus or carbamate pesticides. Be sure that they are designed for use with solvents and pesticides. Never use lined gloves, gloves with wristbands or leather gloves. | Put gloves on and roll up the first inch or two of the cuff. That way when you lift your hands, any liquid on the gloves won't drip down your arms. |
| Hats | Use a chemical-resistant hat, preferably made of washable plastic. The hat may be a hard hat or made of flexible plastic. In either case, it should have a plastic sweatband. Wash and dry entire hat after each use and before storing. Ordinary baseball caps with cloth sweatbands are dangerous as they absorb the pesticide and recontaminate the forehead each time you wear them. Even small amounts of moderately or slightly toxic pesticides may cause severe skin irritation or other illness if exposure continues for several days. | |
| Boots | Wear chemical-resistant, unlined boots. These boots are available in a variety of styles and materials. Neoprene boots are the best. Knee-length boots offer greater protection because they extend above the lower end of the apron. Avoid leather or fabric boots and shoes because these will absorb pesticides and cannot be cleaned effectively. | Wear your pant legs outside the top of your boots. This will prevent spills and splashes from running into the boot and onto your leg. |

## Protecting Your Eyes, Face and Lungs

Wear the following equipment to protect your facial area from exposure:

| EQUIPMENT | PROTECTION | HOW TO WEAR IT |
|---|---|---|
| Goggles | Chemical-resistant goggles keep your eyes safe from both splashing and, if using dry formulations, dusts or granules. Don't use goggles with cloth or elastic headbands as these will absorb pesticides. | Wear goggles snugly on your face so that the sides of your head are protected from splashes. If you wear glasses, make sure you purchase goggles that fit snugly over them. Never wear contact lenses when working around pesticides. |
| Respirators | Only NIOSH-approved respirators should be used. Do not exchange parts of different respirators. (For example, do not use a cartridge produced by Company "A" with a respirator produced by Company "B" as the combination may not provide adequate protection to the user). Dust masks are ineffective in protecting against herbicide vapours. Similarly, the filters on tractor cabs are intended to remove dust and are not designed to protect against herbicide vapours or mists. Chemical cartridge respirators are recommended for outdoor use when mixing and applying herbicides. | When carrying out operations, change filters each day. The cartridge should be replaced when chemical odour becomes apparent or when breathing becomes difficult. New cartridges should always be installed at the beginning of the spray season. Prior to commencing work, check the face seal while the respirator is on the wearer's face. Regardless of design, respirators cannot be worn securely by people wearing beards, moustaches or sideburns. |
| Face Shields | Goggles offer some protection, but frequently full-face protection is advised or required according to the pesticide label. It is especially important to protect your eyes and face when pouring or mixing liquid concentrates. Effective face shields are made of clear plastic. | Since the shield attaches to the hard hat, you can raise or lower it as needed. |

## Avoiding Spray Drift

To minimize the risk of drift, follow these guidelines:

1. Do not spray in winds above 15 km/h (9 mph).
2. Do not spray under dead calm conditions in early morning, night, or late evening. These are often associated with temperature inversions and the combination of these factors can result in long-distance spray drift (2 km or more). Fog or dust that seems to hang in the air is a good indicator of an inversion.
3. Avoid nozzle pressures above 45 psi (310 kPa) for conventional flat fan tips.
4. Use a minimum of 45 L/acre water for all pesticides unless otherwise specified for the product.
5. Take note of buffer zones identified in the "Restrictions" section of this guide. Do not spray when the wind is blowing towards a nearby sensitive crop, shelterbelt, garden, or water body.
6. Use amine formulations of 2,4-D or MCPA where possible. Use special care when applying volatile herbicides (most herbicides in Group 3 and Group 4, particularly ester formulations). Avoid spraying these products on or immediately before hot days.
7. Ensure that air flow from air assisted sprayers is properly set to minimize airblast rebound and drift for different crop canopies.
8. Operate nozzles at their minimum recommended height. For 80° tips, this is 18" (45 cm), and for 110° tips, this is 12" (35 cm). Orienting nozzles forward allows further height reductions.
9. Special nozzles are now available that create coarse, low-drift sprays. Pre-orifice, Turbo-TeeJet, or venturi-type nozzles are available from a number of manufacturers, and these reduce drift by 50 to 95 percent. (Refer to the section entitled **Herbicide Efficacy with Low-Drift Nozzles**)
10. Consider equipping your sprayer with protective shrouds. A number of different designs are available that can reduce drift between 35 and 75 percent.

For more information on reducing drift refer the Factsheet entitled "Spray Drift – Causes and Solutions" available from your local extension office or at the SAF Website: www.agr.gov.sk.ca

## Herbicide Efficacy with Low-drift Nozzles

A number of low-drift nozzles are now available from different suppliers. Well established nozzles, such as the Turbo TeeJet, reduce drift by about 50 percent and provide equivalent efficacy to a standard flat fan nozzle. Newer nozzles ("venturi" types) are best known for their dramatic ability to reduce drift (50 to 95 percent), but information on pesticide efficacy is still scarce. Initial data suggest that these nozzles perform well at conventional carrier volumes, travel speeds, and product rates. Some aspects require special attention:

**Pressure:** Most venturi-type nozzles require higher pressures to operate properly. Below 40 psi (275 kPa), patterns may deteriorate rapidly resulting in poor overlaps and erratic control. Higher pressures are recommended (60 to 80 psi, or 415 to 550 kPa). Drift potential remains low, even at these high pressures. When using automatic rate controllers, make sure your pressures remain high enough for good nozzle performance.

**Water Volume:** Droplet size become more important at lower water volumes. Little is known about low-drift nozzle performance at or below 5 gal/acre (23 L/acre). Since low-drift nozzles generate fewer droplets than conventional nozzles, ensure that water volumes are high enough for coverage when using coarse sprays.

**Weed Type:** Difficult-to-wet weeds, such as wild oats, green foxtail, lamb's-quarters, and cleavers, typically require finer sprays for effective coverage. When using venturi nozzles on these weeds, make sure your pressure is high enough to achieve good coverage. Larger weeds and reduced product rates typically make chemical control more difficult, and these conditions may also reveal some performance differences between nozzles.

**Herbicide Type:** According to preliminary results, herbicides that belong to herbicide Groups 2, 4, and 9 perform well with venturi nozzles, even at normal pressures (40 psi). Application of herbicides in Groups 1, 6, 8, and 10 may require higher pressures with venturi nozzles to maintain good performance, especially under challenging conditions. Wild oat control may be reduced with the coarsest sprays, even when applied at high pressure.

Check with your chemical representative to see if the manufacturer supports the use of low-drift nozzles with their products.

More information is available in the factsheet "Making Sense of New Nozzle Choices," available from your local extension office or at the SAF Website: www.agr.gov.sk.ca

## Handling a Drift Complaint

When spray drift occurs, it is important to take the right steps to resolve the complaint. If you suspect that your crop or property has been damaged because of spray drift, use the following guidelines for resolving the situation.

1. Are you sure that the symptoms or damage you see has been caused by spray drift? Contact your local agricultural office to help determine if the damage is the result of spray drift.
2. Contact the suspected applicator as soon as possible. View the damage with the suspected applicator and determine if that person did, in fact, cause the damage.
3. If the damage was caused by the applicator, determine the extent of the damage and the level of compensation (if any) with the applicator.
4. If the situation cannot be resolved quickly because of disagreements on the extent of damage or level of compensation, contact your local agricultural office to discuss options on how to proceed. Documentation will be required, particularly if insurance companies are involved.
5. The involvement of a private consultant is recommended if documentation is required. Required documentation often includes samples of the damaged plants, photographs, and yield comparisons to determine losses. Your agricultural office can provide you with a list of private consultants in your area.
6. The best approach is to start an open and honest line of communication with the suspected applicator. The majority of drift complaints are resolved quickly and efficiently by communicating with the applicator, without the involvement of outside parties.

## Mixing Pesticides

The ability to control a broad range of weeds or other pests in one pass is the advantage that a mix of two or more products allows. If tank mixing is not done in the correct order, the result could be a tank-load of material that may not control the target pests, cause injury to the crop, plug nozzles, or leave an undesirable residue in the tank that will require extensive cleaning. Mistakes like these are costly, could put the user at unnecessary risk of exposure to the products, or create an environmental disposal problem.

To avoid mixing that may result in incompatibilities, **always consult the label of the products that are being used** to learn the correct order. **Remember to add all like components at the same stage of mixing.** The list below is a general rule-of-thumb for mixing pesticides:

1. Fill the spray tank with 1/4 to 3/4 the amount of water required for the application and turn on the sprayer agitation. Check the products that are being used for the correct amount to add. Once agitation has begun, maintain until the tank is emptied.
2. Add any fertilizer or pH adjuster additives to the tank.
3. Add any wettable powders, water dispersible granules (DF, DG, or WDG), or flowable liquid suspensions to the tank. Add dry products slowly to prevent clogged return lines. Allow sprayer to agitate for a few minutes, allowing the product to become completely suspended in the tank, before adding the next component.

4. Shake any containers of liquid pesticide thoroughly before adding to ensure they are well mixed.
5. Add any pesticides that are solutions (SN) (i.e. amines and salts)
6. Add emulsifiable concentrates (EC, SC) (i.e. esters)
7. Add any surfactants or other adjuvants.

Remember to always consult the label for compatible mixes and recommended mixing order.

Many pesticides will break down if left in the tank for an extended period. Try not to mix any more than you can spray at one time. If you need to stop spraying for a short time, leave the sprayer agitation running to keep products from settling or separating in the tank.

# Container Disposal

Proper disposal of used containers and unused pesticide is important to protecting the environment and preventing the potential contamination of soil and water resources. Rinse all containers prior to disposal to reduce environmental contamination caused by open dumping of unwanted containers. Only mix as much pesticide solution as is needed to treat the desired area.

## Triple Rinsing

Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99.9 percent free of residues, in most cases.

Here are the steps that should be followed:

1. Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
2. Add a measured amount of rinse water or other diluent until container is about one-fifth full.
3. Rinse the container thoroughly and pour the rinsate into the spray tank.
4. Repeat the procedure twice (it should take only about 5 minutes in total).
5. Puncture or break triple rinsed containers to render them non-reusable. Paper bags should be rinsed once prior to disposal.

## Pressure Rinsing

Also available are pressure rinsers that can rinse all sizes of empty pesticide containers that can be lifted into position over the spray tank. A 30 second rinse with a pressure rinser is convenient and just as effective as triple rinsing. Pressure rinsers are constructed to be thrust into the bottom of a metal can or plastic jug. Holes, situated laterally in the rinser tip, direct water from a pressurized source against the inner sides of the container and effectively wash the residual pesticide into the spray tank. Some farmers have found it convenient to attach a rinser to the pump on their large water storage tank to minimize container handling. Pressure rinsers have the added advantage of rendering containers useless by automatically puncturing them.

## Disposal of Containers

Properly rinsed containers should be delivered to a designated pesticide container disposal site. Contact your ag rep, municipal office or weed supervisor for the locations of pesticide container disposal sites in your municipality.

# Sprayer Tank Cleaning

When pesticide application is completed each day it is important to empty and clean the sprayer thoroughly to prevent the breakdown of certain pesticides, prevent adhesion of the pesticide to the sprayer, and to maintain the sprayer parts in good condition. Certain pesticides break down very quickly when left in solution, and several pesticide solutions can be corrosive to sprayer parts. Tank cleaning is especially important when changing from one crop to another or from one pesticide to another. Each year several reports are logged of herbicide damage cause by carryover of product residue in the tank. To avoid the risk of contamination, sprayers should be cleaned as soon as possible after application is completed.

Do not clean sprayers where rinsate can run off into ditches or other water bodies, near sensitive plants or shelterbelts, or where other people or animals are likely to walk, to avoid unnecessary exposure to people, animals and the environment.

There are three basic types of rinse solution for cleaning sprayer tanks. Their recipes and basic procedures are outlined below:

**The Ammonia Rinse** – Fill spray tank and add 1 L of household ammonia (3%) for every 100 L of clean water needed for the rinse and begin agitation. Allow solution to flush through the booms until the boom is completely filled with ammonia solution and top up the tank with water. Circulate the ammonia solution through the tank and pump system for 15 minutes. Flush hoses and booms with ammonia rinse solution again (minimum 5 minutes) before emptying. Remove nozzles and screens and scrub with 0.1 L household ammonia per 10 L clean water and an old toothbrush. Perform clean water rinse to remove ammonia solution prior to next spray load. Some herbicides recommend leaving the ammonia rinse in the tank over night to improve cleaning potential.

**The Fresh Water Rinse** – The spray tank cleaning should begin and end with a fresh water rinse to remove the majority of potential contaminants prior to the cleansing process or prior to the next round of spraying. Drain the tank of its previous contents and fill the tank with clean water. Open nozzle valves and pump clean water through the booms and hoses. Top up the tank with more clean water and circulate/agitate for at least 10 minutes and empty the tank of waste water. If this is the first rinse after spraying, a high pressure hose could be used to clean residue from all surfaces in the tank. Do not enter the tank during the cleaning process.

**The Detergent Rinse** – After rinsing with clean water, fill spray tank and add a heavy-duty detergent at 0.25 L per 100 L of water (some suggest a non-ionic surfactant such as Agral 90 or Agsurf at 0.6 L per 100 L of water). Circulate the mixture for a minimum of 5 minutes and spray out through sprayer nozzles. Nozzles and screens are removed and cleaned individually with the same detergent solution in a small container. Soaking in this solution for several hours also helps to loosen any deposits.

The above solutions are just components of the overall sprayer cleaning process. Typical rinse instructions will repeat a combination of one or two or all of these basic rinses. Below we will give some generic rinse instructions utilizing the basic rinses as components of the larger cleaning procedure. Never enter the tank during the cleaning process as some cleansers may release dangerous gases.

**Method A –**
Drain contents of tank – 1 to 2 X Water Rinse – 2X Ammonia Rinse – 2X Water Rinse (one just prior to the next spraying event)
Products: 2,4-D, Accent, Ally, Atrazine, Avadex, Banvel II, Dichlorprop+2,4-D (Estaprop, Turboprop, Dichlorprop-D), DyVel, Escort, Everest, Express Pack, FlaxMax, Fusion, Harmony Total, MCPA, Muster, Muster Gold, Pinnacle, Poast Ultra, Prism, Pursuit Ultra, Refine Extra, Rustler, Sundance, Tordon 22K, Unity.

**Method B –**
Drain Contents of tank – 2x Water Rinse – 2X Detergent Rinse – 2X Water Rinse
Products: Achieve Liquid*, Achieve Liquid Gold*, Basagran, Buctril M, Centurion, Gramoxone*, Liberty, Prevail*, Puma$^{120}$ Super, Reglone Desiccant*, Reward*, Select, Sencor, trifluralin products, Venture*

*Manufacturers of these products recommend adding a non-ionic surfactant such as Agral 90 or Agsurf at 0.6 L per 100 L of water.

**Method C -**
Drain Contents of tank – Several repetitions of the Water Rinse with nozzles and screens removed and checked for debris.
Products: Amitrol 240, Assure II, Attain, Dual II Magnum, Eclipse, glyphosate products, Horizon, Horizon BTM, Prestige.

The above directions are general processes based on the similarities of tank cleaning recommendations between products in each of the herbicide groupings. Always follow the specific instructions on the product label.

Several products in the guide do not have label instructions regarding tank cleaning. In the case of products that have no cleaning recommendations on the label, there are some basic principals that can be applied. Products that are water based formulations can usually be cleaned from spray tanks using Method C above. Products that are formulated as an EC, SC or F (flowable) or use a petroleum based adjuvant should at least use Method B. The detergent breaks down the oil that may be sticking to the side of the tank. Products in Group 2 (most will already have a recommendation) will require the use of Method A. The ammonia in Method A either increases the solubility of the product allowing it to be easily removed from the tank surfaces or neutralizes these products. If the product that is to be cleaned out of the tank is a combination of these elements, use a combination of Methods to clean the tank. In these cases, use a good commercial tank-cleaning product from a recognized source, with both ammonia and detergent as components.

Group 2 compounds can occasionally be trapped on the tank walls by petroleum based formulations or adjuvants when tank mixed with other products, resulting in tank residues. A way to reduce the chance of this occurring is to add detergent at 0.25 L per 100 L to the Ammonia Rinse portion to assist with the breakdown of the petroleum coating so that the ammonia may rid the tank of Group 2 product.

It is very important to clean sprayers immediately after every use. With a more diverse rotation, the likelihood of damage from lack of care increases dramatically.

# How to Identify Crop and Weed Leaf Stages

Recognition of plant growth stages is essential for effective weed and disease control. Many herbicides and fungicides are safe on a crop only when applied at a specific growth stage. Similarly, weeds are controlled only when they are at certain growth stages.

For most post-emergent products, growth stages are described by the number of leaves. The following is a description of how to count leaves for staging.

## Cereals and Annual Grass Weeds

Manufacturers generally use two different systems of staging for grasses. The minimum stages of application are similar, while the later stages may differ.

Some manufacturers use "Total Leaf Count" stages based on the number of leaves on the entire plant, including tillers or secondary shoots. Most recommendations however, are based on the number of main stem leaves and tillers. Tillers or stools are the secondary shoots or stems of a grass plant. Similar to the branches of a broadleaf plant, tillers will emerge from the axils between the leaf and main shoot.

Tillers usually begin to appear at the 3 or 4 leaf stage. When staging a plant in this manner, be sure to identify the tillers first, then count only leaves that originate from the main shoot.

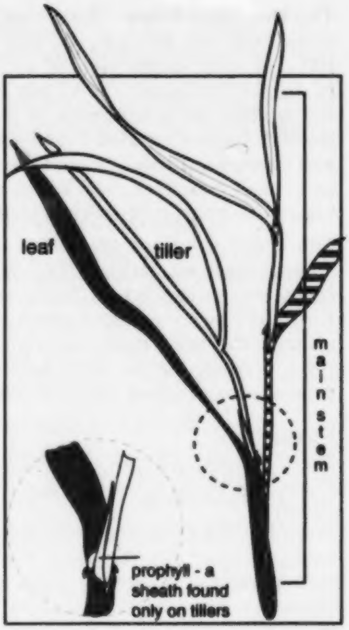

leaf
tiller
main stem
prophyll - a sheath found only on tillers

Figure 2. Leaf Stages of Cereals and Annual Grass Weeds

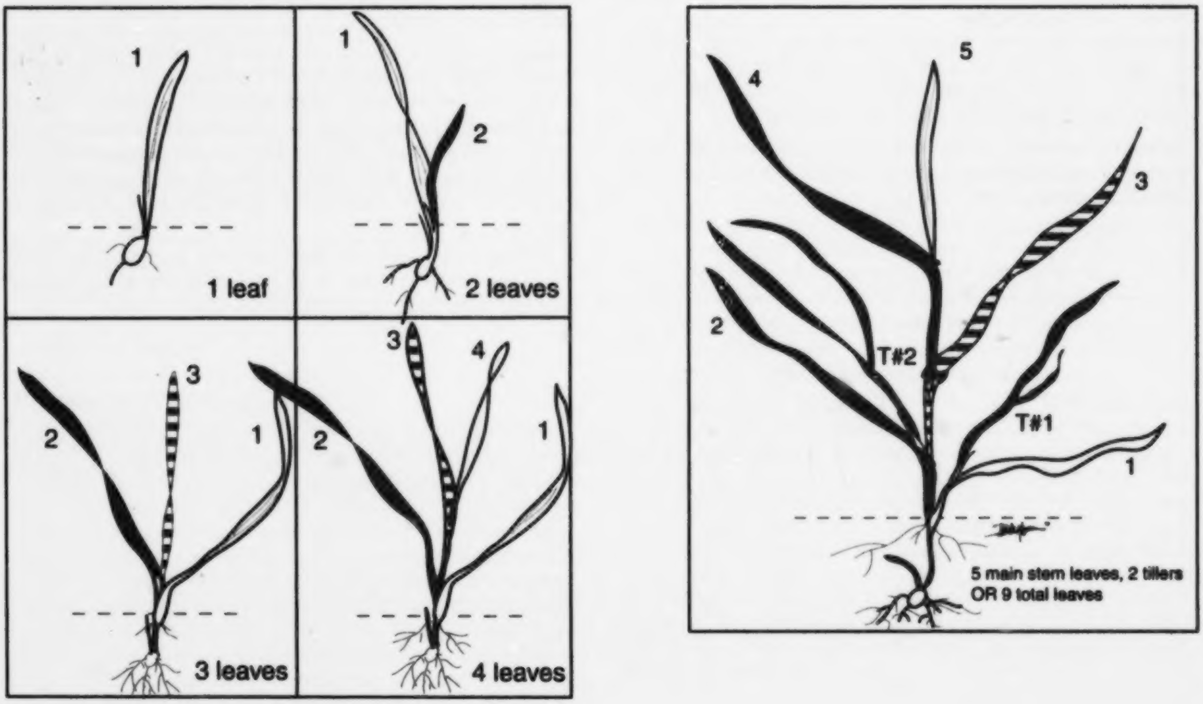
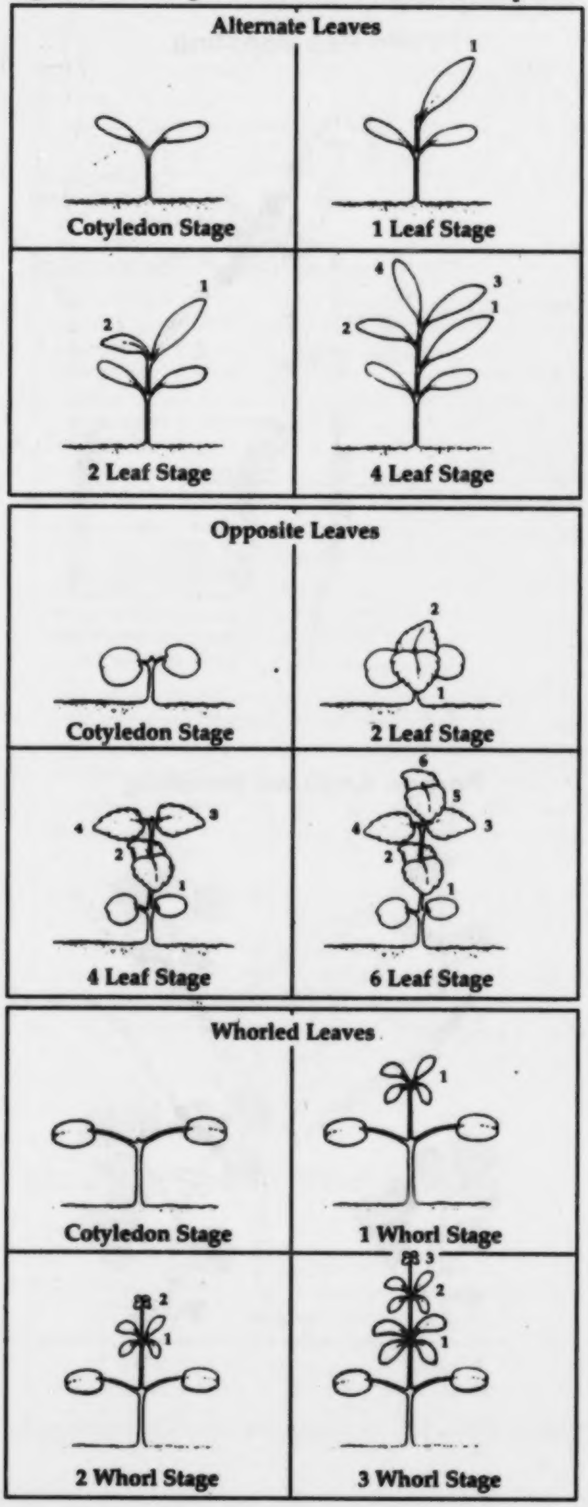

1
1 leaf
1
2
2 leaves
2
3
1
3 leaves
3
4
2
1
4 leaves
4
5
3
2
T#2
T#1
1
5 main stem leaves, 2 tillers
OR 9 total leaves

Figure 3. Leaf Stages of Broadleaf Weeds and Crops


Alternate Leaves
Cotyledon Stage
1
1 Leaf Stage
1
2
2 Leaf Stage
4
3
1
2
4 Leaf Stage
Opposite Leaves
Cotyledon Stage
2
1
2 Leaf Stage
4
3
2
1
4 Leaf Stage
6
5
4
3
2
1
6 Leaf Stage
Whorled Leaves
Cotyledon Stage
1
1 Whorl Stage
2
1
2 Whorl Stage
3
2
1
3 Whorl Stage

## Broadleaf Weeds

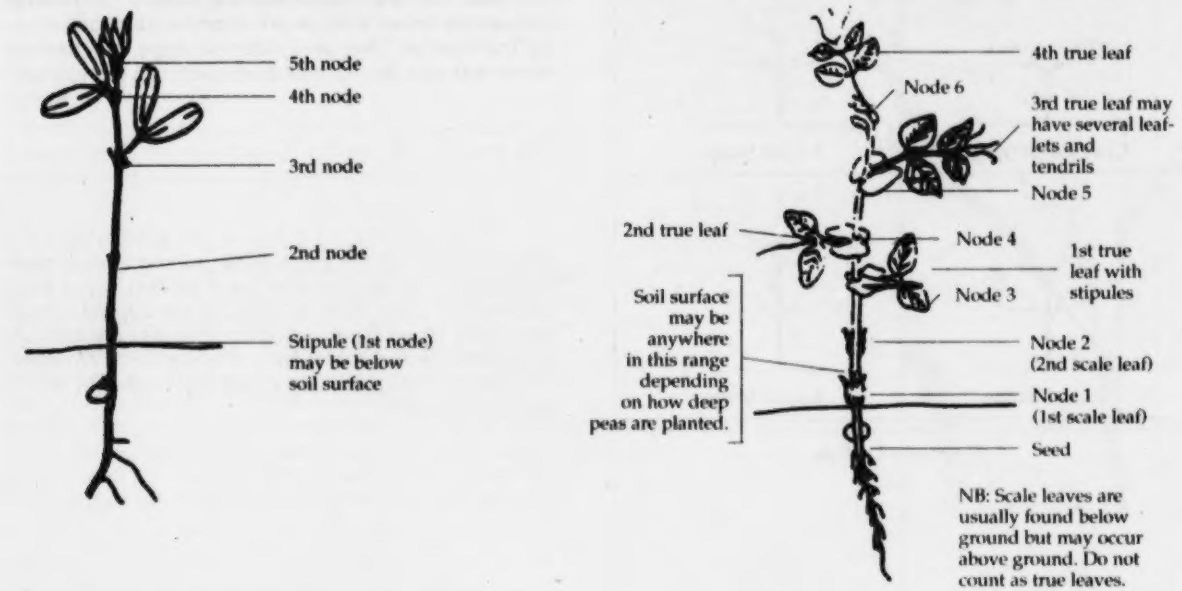
*Cotyledons* - These are the seed leaves that usually emerge above ground. On some plants, such as fababeans, lentils and peas, they stay below the soil surface. Cotyledons are not true leaves and are not counted when determining leaf number. They are a different shape than the true leaves and may dry up and disappear at an early stage.

*Alternate leaves* - Some plants have one leaf at each node on the stem. The next leaf emerges at the next higher node and extends away from the stem in the opposite direction. These plants (lamb's quarters and wild mustard are good examples) are said to have alternate leaves. To determine the leaf stage, simply count the number of leaves present (Figure 3).

*Opposite leaves* - Plants with two leaves at each node, one on each side of the stem, are said to have opposite leaves. The next pair of leaves on the next node are rotated about 45° so that they are not directly over the previous pair. Plants with opposite leaves have even-leaf numbers only. When counting, the leaf number progresses from cotyledons to 2 leaf, 4 leaf, etc. These plants generally appear shorter than plants with alternate leaves at a similar leaf stage. **Be sure to count each pair as two leaves.** Hemp nettle is a weed that has opposite leaves (Figure 3).

*Whorled leaves* - More complex plants like cleavers may have whorled leaves. These plants have three or more leaves at each node on the stem. The leaf number in each whorl may vary, so be sure to count each individual leaf unless the Guide or label recommendation refers to the number of leaf whorls (Figure 3).

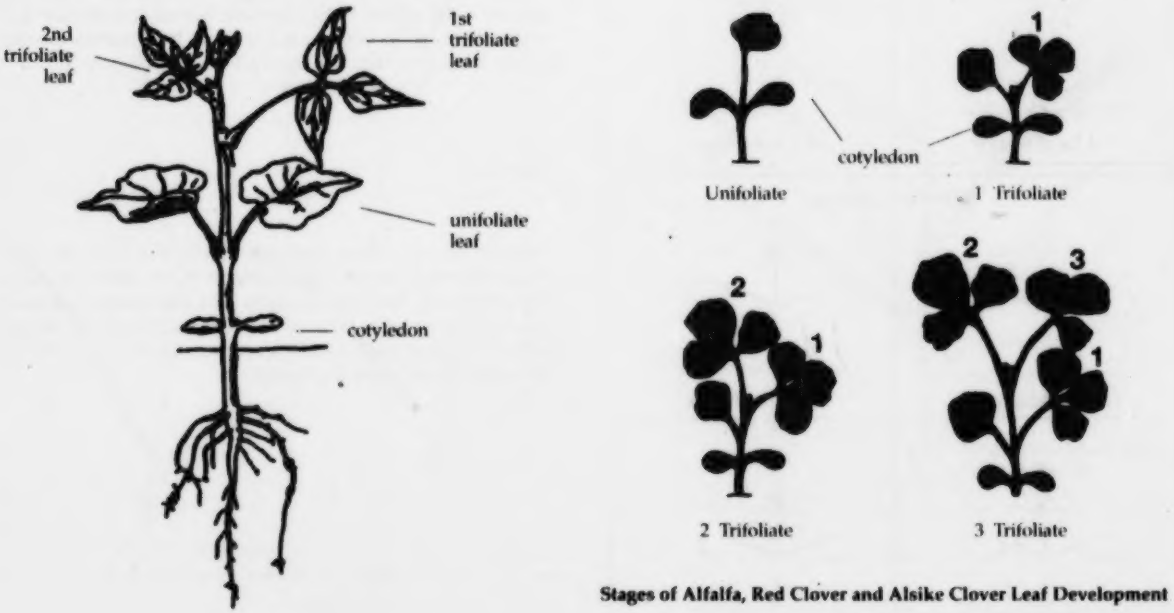
Figure 4. Leaf Stages of Certain Special Crops and Forages



Lentil Seedling

Field Pea Seedling

5th node
4th node
3rd node
2nd node
Stipule (1st node) may be below soil surface
4th true leaf
Node 6
3rd true leaf may have several leaflets and tendrils
Node 5
2nd true leaf
Node 4
1st true leaf with stipules
Node 3
Soil surface may be anywhere in this range depending on how deep peas are planted.
Node 2 (2nd scale leaf)
Node 1 (1st scale leaf)
Seed
NB: Scale leaves are usually found below ground but may occur above ground. Do not count as true leaves.



Dry Bean Seedling

Forage Legume Seedling

2nd trifoliate leaf
1st trifoliate leaf
unifoliate leaf
cotyledon
1
2
3
cotyledon
Unifoliate
1 Trifoliate
2 Trifoliate
3 Trifoliate

Stages of Alfalfa, Red Clover and Alsike Clover Leaf Development

# Weed Control

The use of in-crop herbicides to control weeds is often very important in determining the success or failure of a crop. However, many other practices that can be implemented before and after a herbicide application can help to reduce weed competition. The use of these practices is termed Integrated Weed Management.

## Integrated Weed Management

A farming system that utilises an array of inter-dependent cultural, biological and herbicidal weed control practices is implementing Integrated Weed Management (IWM). It is essential that IWM involves an array of tools including the rotation of available herbicide groups, ensuring that weeds are exposed to a diverse range of control mechanisms. The principal aim of IWM is to reduce selection for resistance to any single control agent and to delay or prevent the development of herbicide resistant weeds.

Practising IWM does not mean abandoning chemical weed control, just relying on it less. For example:

- You may decide to choose a normal-height wheat or a tall, viny pea variety for a certain field. These crop selections will compete strongly with weeds, possibly allowing you to skip a spray operation.
- You could insert a short-term forage crop into your crop rotation. Studies show that short-term alfalfa stands can reduce wild oat and green foxtail populations by up to 80 percent the year after breaking.
- Early sown barley may give you enough of a "jump" on the weeds that you can avoid herbicide applications.
- Use of vigorous, high-quality seed, sown shallow, can give you better crop competition than poor-quality or deeply sown crop seed.
- Banding nitrogen near the seed can give your crop an advantage over weeds.

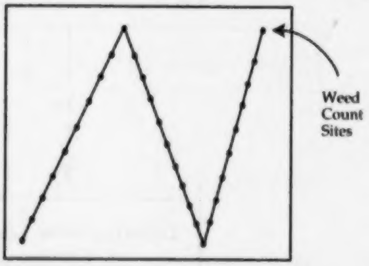
For more information, refer to "Integrated Weed Management: Making it Work on Your Farm" factsheet, available from both Manitoba Agriculture and Food and Saskatchewan Agriculture and Food.

# Making Spray Decisions

## Field Scouting

Field scouting is an important tool for making informed spray decisions. Accurately assessing the type and number of weeds in the field will help you determine if a spray operation is necessary. The scouting pattern diagram on this page provides a guideline for scouting a field. The entire field should be walked to get a feel for the distribution of the weeds present. A minimum of 20 weed counts should be taken across the field. A smaller number may be used, but be aware that accuracy decreases as the number of counts gets smaller. Count the number of weeds in a 1 $m^2$ or a 0.25 $m^2$ area and divide the total number of weeds by the number of counts taken to obtain an average for the field. If using 0.25 $m^2$ samples, make sure to multiply by four so your average is for a 1 $m^2$ area.

Some weeds are not distributed uniformly and may be found in patches (for example, Canada thistle) or in low spots. As well, the type and number of weeds found along the field edges may be very different from those found inside the field. These areas should be considered separate from the rest of the field. If possible, patches, low spots, and field borders should be treated separately, as field wide spraying may not be required. Look out for new invading weeds and patches of herbicide-resistant weeds. Herbicide-resistant weeds and new invaders should be controlled, regardless of their number, to prevent them from spreading and becoming a serious control problem. Mapping your field's weed problems will allow you to monitor the spread of weed patches over time and help you assess the effectiveness of your control program.



## Yield Losses Caused by Weeds

Knowing the amount of crop yield loss caused by a given weed density will help you decide if a spray operation is required. The tables on the following pages give an indication of the yield loss caused by some of the important grassy weeds.

**THESE TABLES SHOULD BE USED ONLY AS A GUIDE.** The figures are based on Western Canadian research trials and will not be accurate all of the time. The yield loss values apply only to healthy, well fertilized crops with good stand establishment. Crops that are diseased or emerged unevenly will not compete well with weeds and will suffer larger yield losses than indicated in these tables. The yield loss figures are based on competition from single weed species only. Other weeds, such as wild mustard or Canada thistle, must be controlled if the figures are to be accurate. As well, the tables are based on competition from normal height crops. Semi-dwarf or hybrid varieties may not compete as well with weeds and the figures may no be accurate in these cases.

**Table 1. Yield Losses (Percent) in Wheat Caused by Wild Oats.**

| | Wild Oat Density – Number Per Square Metre | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| **Wild Oats are 1 Leaf Stage Ahead of the Crop** | 1 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 15 | 17 | 19 | 22 | 26 | 29 | 32 | 34 | 37 |
| **Wild Oats are the Same Leaf Stage as the Crop** | 1 | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 14 | 16 | 18 | 20 | 22 | 24 |
| **Wild Oats are 1 Leaf Stage Behind the Crop** | 0 | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 8 | 10 | 11 | 13 | 14 | 15 |

*Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)*

**Figure 1. Spray Decision Guideline for Wild Oats in Wheat.**

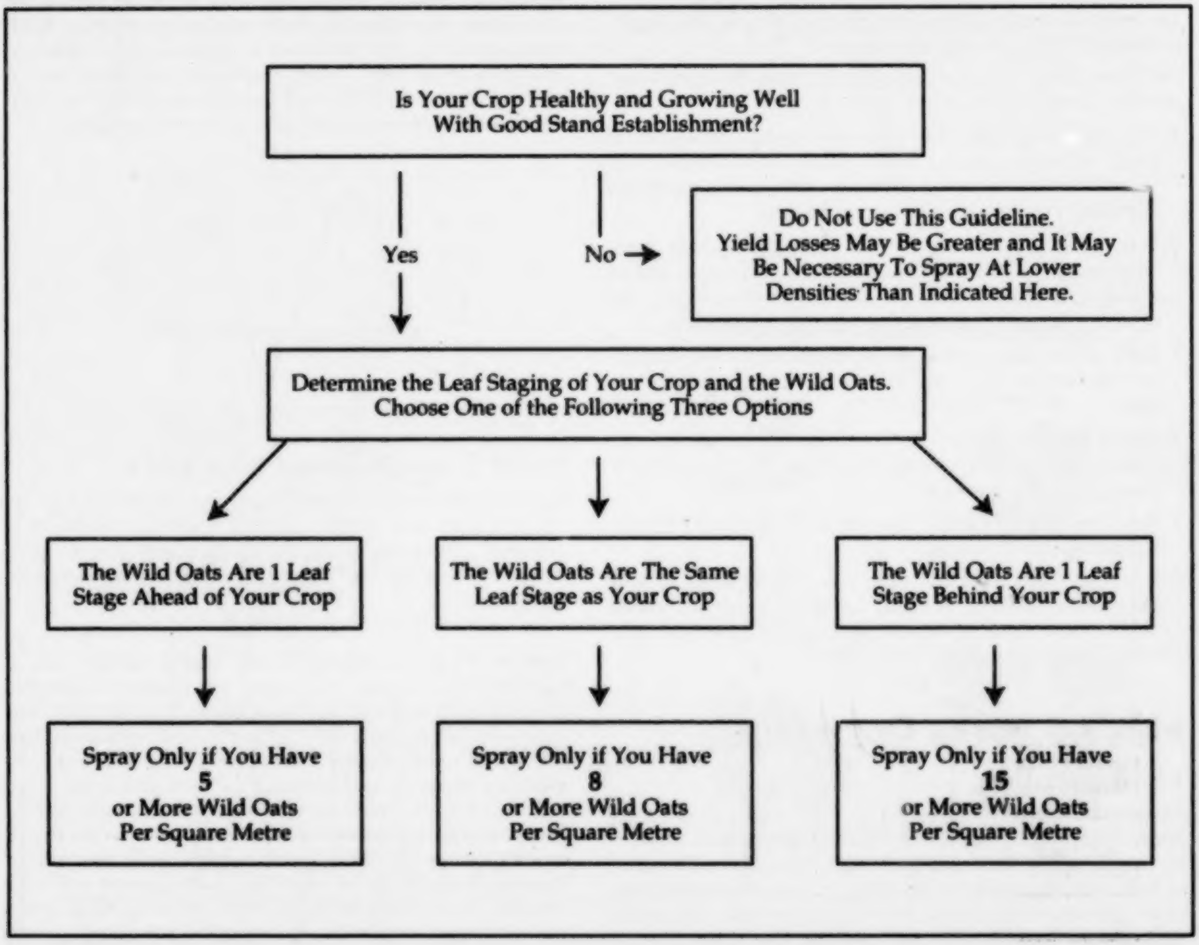
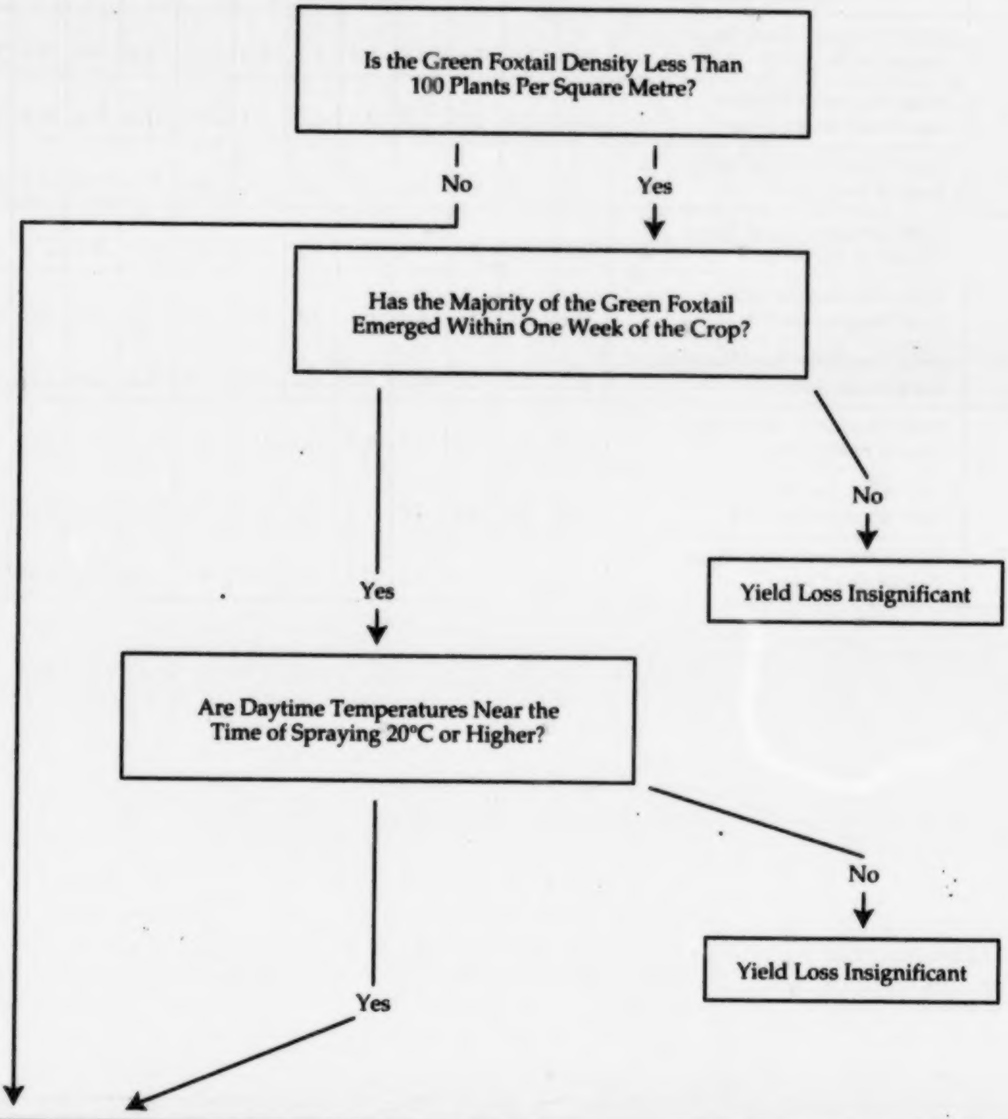

Is Your Crop Healthy and Growing Well With Good Stand Establishment?
Yes
No
Do Not Use This Guideline. Yield Losses May Be Greater and It May Be Necessary To Spray At Lower Densities Than Indicated Here.
Determine the Leaf Staging of Your Crop and the Wild Oats. Choose One of the Following Three Options
The Wild Oats Are 1 Leaf Stage Ahead of Your Crop
The Wild Oats Are The Same Leaf Stage as Your Crop
The Wild Oats Are 1 Leaf Stage Behind Your Crop
Spray Only if You Have 5 or More Wild Oats Per Square Metre
Spray Only if You Have 8 or More Wild Oats Per Square Metre
Spray Only if You Have 15 or More Wild Oats Per Square Metre

**Table 2. Yield Losses (Percent) in Wheat Caused by Green Foxtail (Wild Millet).**


Is the Green Foxtail Density Less Than 100 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

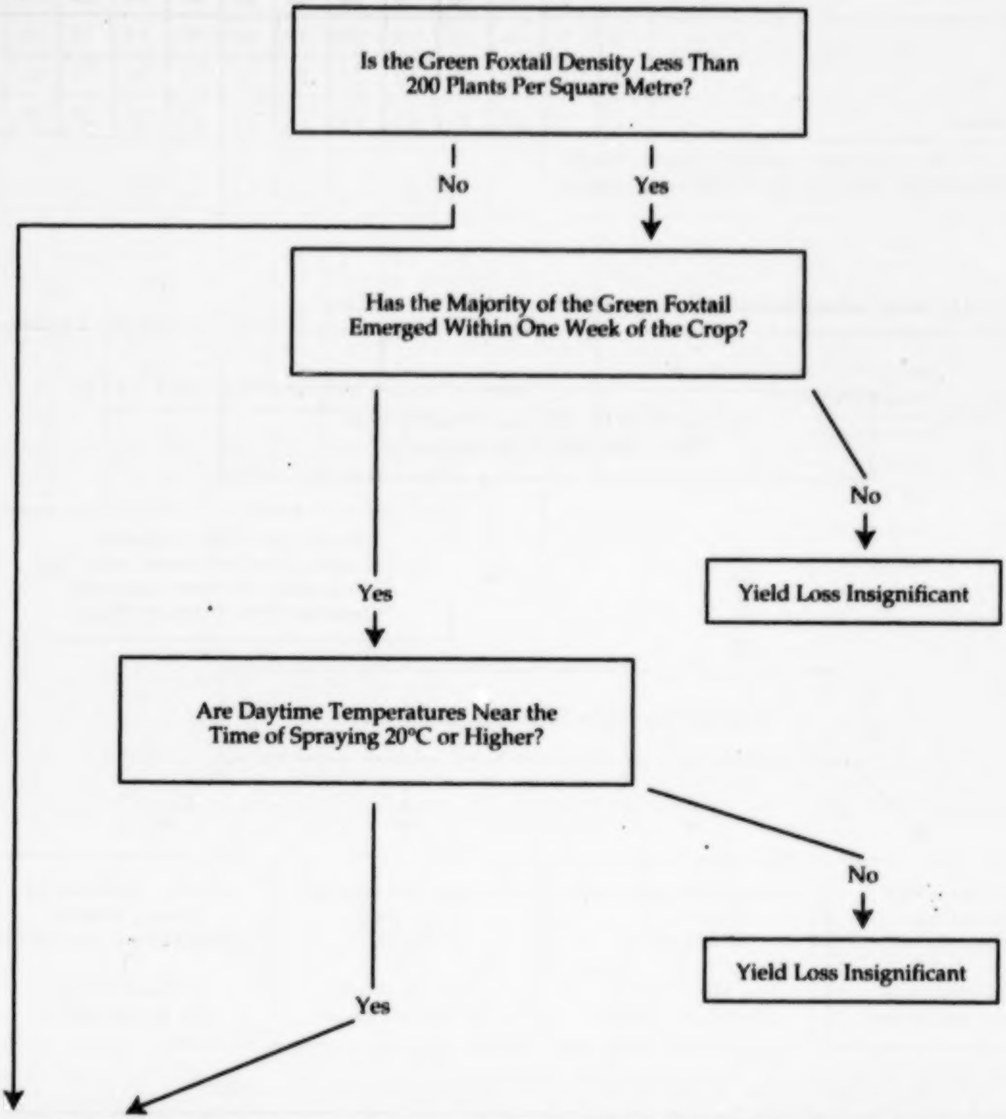
| **Green Foxtail Density (no. per square metre)** | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Yield Loss (percent)** | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 11 | 14 | 16 | 18 | 20 | 23 |

*Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)*

Table 3. Yield Losses (Percent) in Barley Caused by Wild Oats.

| Crop Density (plants/m²) | Relative Emergence | Wild Oat Density (plants/m²) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 70 | 100 | 150 |
| 300 | Wild Oats are 1 Leaf Stage Ahead of the Crop | 0.3 | 1.4 | 2.8 | 4.1 | 5.4 | 6.7 | 8.0 | 10.3 | 12.6 | 16.8 | 22.4 | 30.2 |
| | Wild Oats are the Same Leaf Stage as the Crop | 0.3 | 1.3 | 2.5 | 3.7 | 4.8 | 6.0 | 7.1 | 9.2 | 11.3 | 15.1 | 20.3 | 27.6 |
| | Wild Oats are 1 Leaf Stage Behind the Crop | 0.2 | 0.9 | 1.7 | 2.6 | 3.4 | 4.2 | 5.0 | 6.6 | 8.1 | 11.0 | 15.0 | 20.9 |
| 225 | Wild Oats are 1 Leaf Stage Ahead of the Crop | 0.4 | 1.9 | 3.6 | 5.4 | 7.0 | 8.6 | 10.2 | 13.1 | 15.9 | 20.9 | 27.4 | 36.2 |
| | Wild Oats are the Same Leaf Stage as the Crop | 0.3 | 1.6 | 3.1 | 4.6 | 6.1 | 7.5 | 8.8 | 11.4 | 13.9 | 18.4 | 24.4 | 32.6 |
| | Wild Oats are 1 Leaf Stage Behind the Crop | 0.2 | 1.0 | 2.0 | 3.0 | 4.0 | 4.9 | 5.8 | 7.6 | 9.3 | 12.6 | 17.1 | 23.6 |
| 175 | Wild Oats are 1 Leaf Stage Ahead of the Crop | 0.5 | 2.3 | 4.6 | 6.7 | 8.7 | 10.7 | 12.5 | 16.1 | 19.3 | 25.1 | 32.3 | 41.8 |
| | Wild Oats are the Same Leaf Stage as the Crop | 0.4 | 1.9 | 3.8 | 5.6 | 7.3 | 8.9 | 10.5 | 13.6 | 16.4 | 21.6 | 28.2 | 37.1 |
| | Wild Oats are 1 Leaf Stage Behind the Crop | 0.2 | 1.1 | 2.3 | 3.4 | 4.4 | 5.5 | 6.5 | 8.5 | 10.4 | 14.0 | 18.9 | 25.9 |

**Table 4. Yield Losses (Percent) in Barley Caused by Green Foxtail (Wild Millet).**


Is the Green Foxtail Density Less Than 200 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

| **Green Foxtail Density (no. per square metre)** | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Yield Loss (percent)** | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 13 | 14 |

*Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)*

**Table 5. Yield Losses (Percent) in Canola Caused by Wild Oats and Volunteer Cereals.**

| | Weed Density – Number Per Square Metre | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **4** | **6** | **8** | **10** | **12** | **14** | **16** | **18** | **20** | **25** | **30** |
| **Wild Oats** | 3 | 5 | 6 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 18 |
| **Volunteer Wheat** | 1 | 3 | 6 | 8 | 10 | 11 | 12 | 14 | 15 | 16 | 17 | 19 | 21 |
| **Volunteer Barley** | 3 | 5 | 8 | 10 | 12 | 14 | 15 | 17 | 18 | 19 | 20 | 23 | 25 |

*Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta)*
*O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)*

**Figure 2. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Canola.**

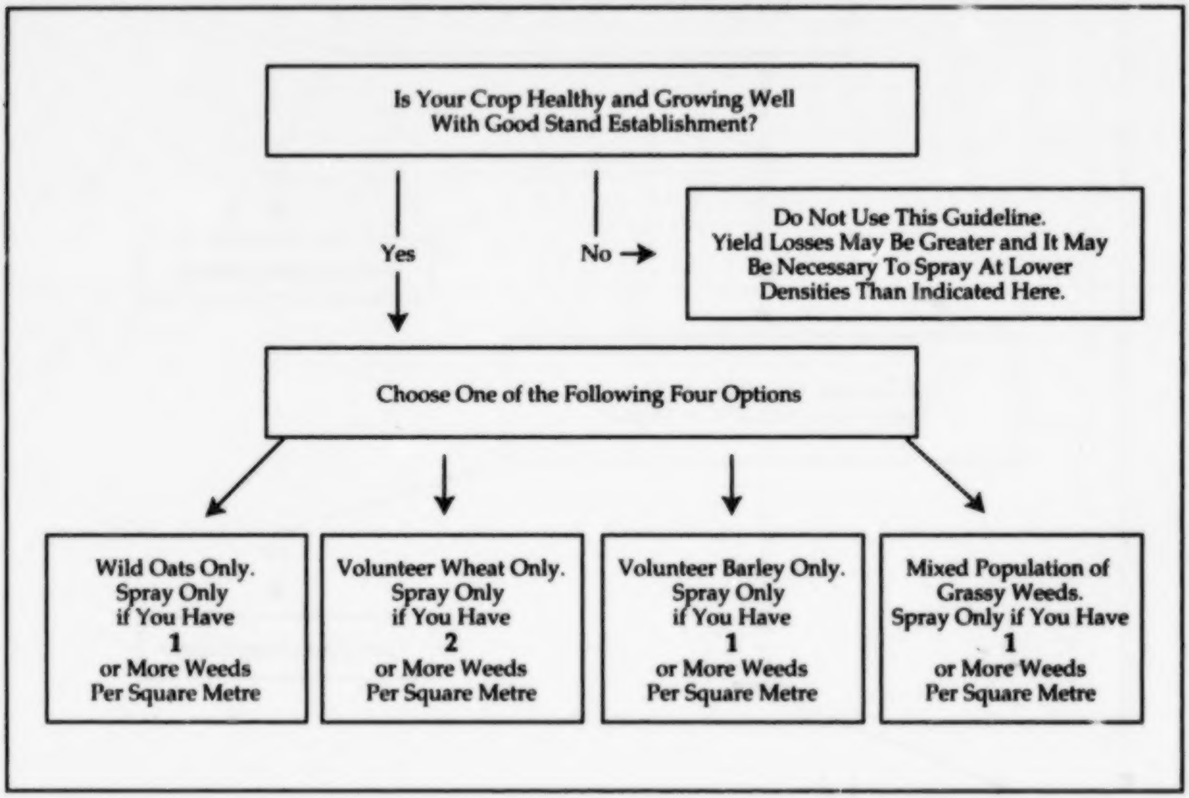
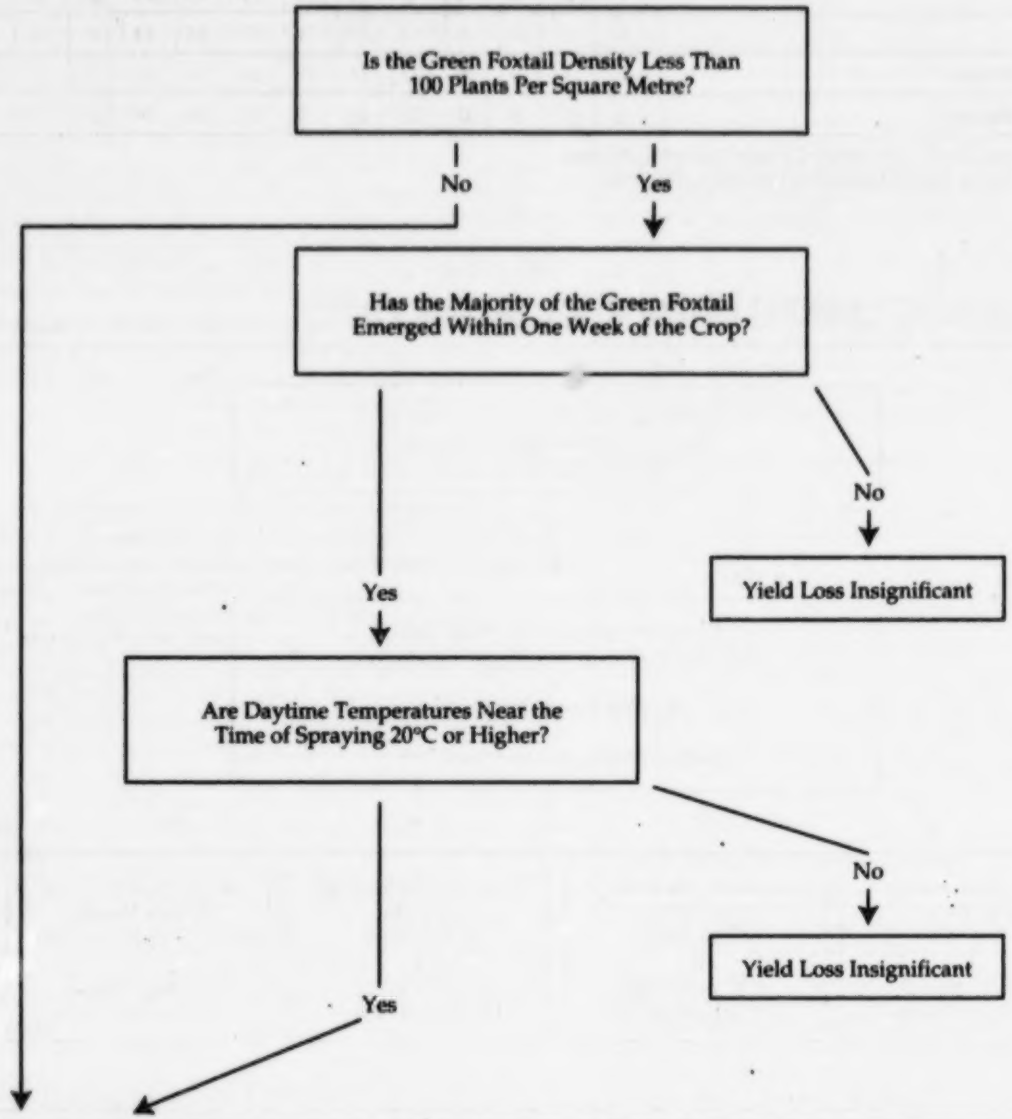

Is Your Crop Healthy and Growing Well With Good Stand Establishment?
Yes
No
Do Not Use This Guideline. Yield Losses May Be Greater and It May Be Necessary To Spray At Lower Densities Than Indicated Here.
Choose One of the Following Four Options
Wild Oats Only. Spray Only if You Have 1 or More Weeds Per Square Metre
Volunteer Wheat Only. Spray Only if You Have 2 or More Weeds Per Square Metre
Volunteer Barley Only. Spray Only if You Have 1 or More Weeds Per Square Metre
Mixed Population of Grassy Weeds. Spray Only if You Have 1 or More Weeds Per Square Metre

**Table 6. Yield Losses (Percent) in Canola Caused by Green Foxtail (Wild Millet)**


Is the Green Foxtail Density Less Than 100 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

| **Green Foxtail Density (no. per square metre)** | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Yield Loss (percent)** | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 13 | 15 | 18 | 20 | 23 | 25 |

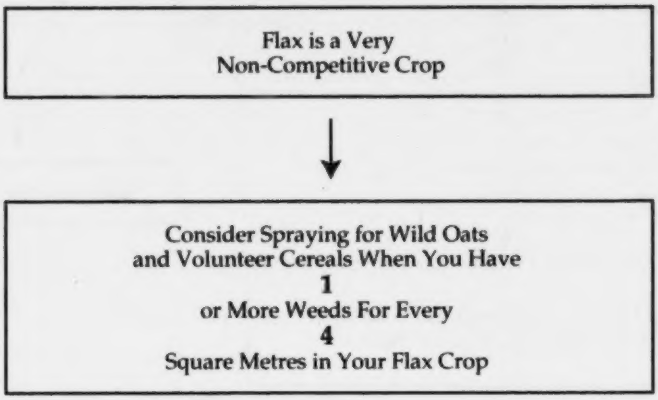
*Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)*

**Table 7. Yield Losses (Percent) in Flax Caused by Wild Oats and Volunteer Cereals.**

| | Weed Density – Number Per Square Metre | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **Wild Oat** | 6 | 8 | 10 | 12 | 13 | 15 | 16 | 17 | 18 | 19 |
| **Volunteer Wheat** | 6 | 11 | 15 | 18 | 22 | 24 | 27 | 29 | 31 | 33 |
| **Volunteer Barley** | 6 | 12 | 16 | 21 | 24 | 28 | 31 | 34 | 36 | 39 |

*Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta)*
*Friesen et al., University of Manitoba (Winnipeg, Manitoba)*

**Figure 3. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Flax.**



Flax is a Very
Non-Competitive Crop

Consider Spraying for Wild Oats
and Volunteer Cereals When You Have
1
or More Weeds For Every
4
Square Metres in Your Flax Crop

## Deciding to Spray – Economic Thresholds and Herbicide Resistance

An **economic threshold** is the level of infestation at which lost yield exceeds the cost of the chemical and its application. Determining the economic threshold will help you decide if a spray operation is necessary.

The following example outlines how to determine an economic threshold:

You have a wild oat problem in your wheat. After a thorough field scouting you have determined that your field has an average density of 35 wild oats per square metre. You know that the crop and weeds are at the same leaf stage. Using Table 1, choose the "Same Leaf Stage" row and read across to **35** wild oats per square metre. You will find that your yield loss will be about **18** percent.

You think it could be a 40 bushel per acre wheat crop, and expect to get $3 per bushel for it. Therefore:

40 bushels x 0.18 (percent of expected yield loss) =
7.2 bushels per acre of lost yield

7.2 bushels x $3 per bushel =
**$21.60 per acre** of lost income

Now find out the price of your herbicide. Most wild oat herbicides for wheat cost about $15 per acre. In this case, lost income exceeds the cost of the herbicide and application, so spraying would be justified.

Alternatively, you may want to use the figures provided with some of the yield loss tables. These figures provide flowcharts to assist you in making spray decisions. In some cases the flowcharts may indicate to spray when you do not have an economic threshold weed density, but most times they will prevent you from spraying unnecessarily.

Another factor to consider when deciding whether to spray is your herbicide rotation. A one in three rotation of herbicide groups is currently recommended to delay the development of herbicide resistance for weeds such as wild oats and green foxtail. Skipping a spray operation will give you an extra year of flexibility in your herbicide rotation. This means that you have one extra herbicide group to choose from the year after you skipped the spray operation. When making spray decisions, the ability to rotate herbicides should be considered in addition to the economics of spraying.

## Making the Spray Decision

Remember that economic thresholds should be used only as guides when making a spray decision. Lost income caused by dockage or downgrading must also be considered. **FIELDS THAT ARE NOT SPRAYED THIS YEAR HAVE A HIGHER POTENTIAL FOR PROBLEMS THE FOLLOWING YEAR BECAUSE OF WEED SEED RETURN.** A farmer's experience and common sense play an important role when deciding to spray. Used properly, however, the economic threshold can be an important tool in making spray decisions.

## Weed Resistance to Herbicides

In recent years, the number of herbicide-resistant weeds and the areas they infest have increased.

Most herbicide-resistant weed infestations have developed following repeated use of the same herbicide (or herbicide group) for a number of years on the same field. Growers who have developed weed resistance on their farms will typically see a weed, which is normally controlled by a herbicide, escape uncontrolled after a number of years of use of the same product or product group. Individual plants may be resistant to 1.5 up to 10 or more times the normal field rate.

## Herbicide Groups

To help you plan your herbicide program, the following table lists "herbicide groups." To slow down the process of developing weed resistance, use products from different groups from year to year on your fields.

**Table 1: Herbicide Groups Based on Mode of Action**

| |
|---|
| **Group 1 (contain ACCase grasskillers)**<br>Achieve, Achieve Liquid Gold*, Assure II, clethodim, Elite*, FlaxMax*, Fusion, Harmony Total*, Horizon, Horizon BTM*, Muster Gold*, Odyssey DLX*, Poast Ultra, Prevail*, Puma$^{120}$ Super, Pursuit Ultra*, Venture |
| **Group 2 (contain ALS/AHAS inhibitors)**<br>Absolute*, Accent, Adrenalin*, Ally, Assert, Escort, Everest, Express Pack*, Express TNG, Frontline*, Frontline 2,4-D*, Harmony Total*, K2, Muster, Muster Gold*, Odyssey, Odyssey DLX*, Option, Pinnacle, PrePass*, Prism, Pursuit, Pursuit Ultra*, Refine Extra, Refine M*, Solo, Spectrum*, Sundance, Triton C*, Trophy*, Ultim, Unity* |
| **Group 3 (contain mitotic inhibitors)**<br>Advance, Bonanza, Edge, Fortress*, Rival, Treflan |
| **Group 4 (contain growth regulator herbicides)**<br>2,4-D, 2,4-DB, Absolute*, Achieve Liquid Gold*, Adrenalin*, Attain, bromoxynil + 2,4-D ester*, bromoxynil+MCPA ester*, Curtail M, dicamba, dicamba+mecoprop+MCPA, dichlorporp+2,4-D, DyVel, DyVel DSp, Eclipse*, Elite*, Express Pack*, FlaxMax*, Frontline*, Frontline 2,4-D*, Grazon, Horizon BMT*, Lontrel, MCPA, MCPB+MCPA, mecoprop, Prestige, Prevail*, Refine M*, Remedy, Rustler*, Shotgun*, Spectrum*, Tordon 22K, Triton C*, Trophy* |
| **Group 5 (contain photosynthetic inhibitors – triazines)**<br>Atrazine, Laddock*, Primextra II Magnum*, Sencor, Shotgun*, simazine, Velpar |

| |
|---|
| **Group 6 (contain photosynthetic inhibitors – nitriles/ benzothiadiazoles)**<br>Achieve Liquid Gold*, Basagran, bromoxynil, bromoxynil + 2,4-D ester*, bromoxynil+MCPA ester*, Elite*, Horizon BTM*, Laddock*, Unity* |
| **Group 7 (contain photosynthetic inhibitors – ureas/ amides)**<br>linuron |
| **Group 8 (unknown mode of action)**<br>Avadex BW, Avenge, Eptam 8E, Eradicane 8E, Fortress* |
| **Group 9 (contain inhibitors of EPSP synthase)**<br>Credit, Eclipse*, Factor, Glyfos, Maverick, PrePass*, Renegade, Roundup (Dry, Original, Transorb, Ultra, WeatherMax), Rustler*, Touchdown, Vantage, Vantage Plus |
| **Group 10 (contain inhibitors of glutamine synthetase)**<br>Liberty |
| **Group 11 (inhibit carotenoid synthesis - triazoles)**<br>Amitrol 240 |
| **Group 14**<br>Reflex |
| **Group 15 (inhibit cell division - benzamides, chloroacetamides)**<br>Dual II Magnum, Frontier, Kerb, Primextra II Magnum* |
| **Group 22 (membrane rupture, photosynthetic inhibitors)**<br>Gramoxone, Reglone, Reward |

*Products contain more than one active ingredient and appear in more than one group. In some instances, both active ingredients act to kill the same weed using different modes of action. In these instances, use of tank mixes may slow down the process of developing weed resistance.

New herbicides do not necessarily have a unique mode of action and may fall within the groups listed in the charts.

Herbicides that have the same mode of action may not control the same weed spectrum or have the same crop safety. For example, Assert and Ally have the same mode of action; however, Assert controls wild oats while Ally does not.

## How Herbicides Work

After applying a herbicide, fields can be scouted to determine the effectiveness of the treatment. The symptoms of different herbicide groups, and the approximate time it takes to develop these symptoms, is listed in the table below. Weed patches that are not affected should be noted and checked, as they may be herbicide resistant. Note that symptoms may take longer to develop when conditions are not conducive to rapid plant growth.

Table 2: The Mode of Action, Site of Uptake and Symptoms of Different Herbicide Groups.

| Herbicide Group | Mode of Action | Site of Uptake | Weed symptoms/timing | |
|---|---|---|---|---|
| | | | Grass weeds | Broadleaf weeds |
| 1 | Systemic | Foliar | Reduced growth, yellowing of growing point in 1-3 weeks. Newest leaf of affected plant pulls out easily in 3 to 5 days. | Tolerant |
| 2 | Systemic | Foliar/Soil | Newest leaves yellowed in 3-10 days, dead in 1-3 weeks. | Discolored (red/yellow/purple) at the growing point and spreading to the whole plant in 1-3 weeks. |
| 3 | Systemic | Soil | Reduced emergence, poor root development of emerged plants. Roots often swollen/stunted and root tips darkened. | Reduced emergence, poor root development of emerged plants. |
| 4 | Systemic | Foliar | Yellowed / purpled leaves in 1-2 weeks, plant death in 2-4 weeks. | Abnormal growth (twisted stems, cupped leaves) in 2-10 days. |
| 5 | Systemic | Soil | Wilted and yellowed oldest leaves, death in 7-10 days. | Wilted and yellowed oldest leaves, death in 7-10 days. |
| | Contact | Foliar | Yellowed oldest leaves, death within days.” | Bleached oldest leaves, death within days. |
| 6 | Contact | Foliar | Some leaf burn possible. | Yellowed leaves in 2-4 days, death in 1-2 weeks. |
| 7 | Systemic | Soil | Yellowed and stunted plants, death in 10-14 days. | Yellowed and stunted plants, death in 10-14 days. |
| | Contact | Foliar | Interveinal yellowing of oldest leaves, death within days. | Interveinal yellowing of oldest leaves, death within days. |
| 8 | Contact | Foliar | Yellowed leaves in 3-7 days, stunted plants. | Tolerant |
| | Systemic | Soil | Reduced emergence, emerged leaves dark green/blue. | Reduced emergence, emerged leaves dark green/blue. |
| 9 | Systemic | Foliar | Wilted, yellowed leaves in 7-10 days. | Wilting, yellowing of plant in 7-10 days. |
| 10 | Contact | Foliar | Wilted, bleached leaves in 3-5 days, death in 1-2 weeks. | Wilted, bleached leaves in 3-5 days, death in 1-2 weeks. |
| 11 | Systemic | Foliar | Plants wilted in 2-3 days, bleached and purpling leaves in 1-2 weeks. | Plants wilted in 2-3 days, bleached leaves in 1-2 weeks. Perennial plants die slowly. |
| 14 | Contact | Foliar | Some leaf burn. | Leaves yellowed and dessicated in 1-3 days. |
| 15 | Sytemic | Soil | Reduced emergence, emerged plants stunted. | Reduced emergence, emerged plants stunted. |
| 22 | Contact | Foliar | Leaves wilted within hours, dessicated in 1-3 days. | Leaves wilted in 1-3 days, dessicated and dead in 3-7 days. |

## How to Identify Weed Resistance

It is important to avoid confusing herbicide failure caused by resistance with herbicide failure caused by various other factors (such as weather or application errors). When a herbicide fails to control weeds because of weather or application factors, that herbicide may work in the field the next season. But when herbicides fail because of the development of resistance, they will fail in subsequent years, regardless of weather or application procedures.

Herbicide resistance should be suspected under the following conditions:

- A weed species that the herbicide controlled in previous seasons now escapes the treatment, while other weeds that appear on the label continue to be controlled in the field.
- The escapes cannot be attributed to adverse weather or emergence after application (if a post-emergence product is in question).
- Irregular-shaped patches of a weed develop where the herbicide gives little or no control.
- Records of the past history of the field show repeated use of the same herbicide, or combinations of herbicides, that kill the weed in question in the same way.

**Table 3: Herbicide-Resistant Weeds in Western Canada**

| WEED | HERBICIDE GROUP | LOCATIONS CONFIRMED |
|---|---|---|
| Canada Fleabane | Group 9 | Occurs in several US states |
| Cleavers | Group 2 | AB |
| | Group 4 | AB |
| | Multiple combinations of:Groups 2 & 4 | AB |
| Chickweed | Group 2 | AB |
| Green Foxtail | Group 1 | AB, MB, SK |
| | Group 2 | Occurs in MB & Ontario |
| | Group 3 | AB, MB, SK |
| | Multiple combinations of: Groups 1 & 3 | MB, SK |
| Hemp-nettle | Group 2 | MB |
| | Group 4 | AB |
| Kochia | Group 2 | AB, MB, SK |
| | Group 4 | Occurs in North Dakota and Montana |
| Lamb's-quarters | Group 2 | Occurs in Ontario |
| | Group 5 | Occurs in Ontario |
| Marshelder (Giant ragweed) | Group 2 | Occurs in North Dakota |
| Mustard, Ball | Group 2 | AB |
| Mustard, Wild | Group 2 | AB, MB, SK |
| | Group 4 | MB |
| | Group 5 | MB |
| Persian Darnel | Group 1 | SK |
| Redroot pigweed | Group 2 | Occurs in MB, Ontario and North Dakota |
| | Group 5 | Occurs in Ontario |
| Russian thistle | Group 2 | Occurs in SK, North Dakota and Montana |
| Spiny Annual Sow-thistle | Group 2 | AB |
| Stinkweed | Group 2 | AB |
| Wild oat | Group 1 | AB, MB, SK, |
| | Group 2 | AB, MB, SK |
| | Group 8 | AB, MB, SK |
| | Multiple combinations of: Groups 1 & 2, 1 & 8, 2 & 8, 1, 2 & 8 | AB, MB, SK |

See Table 1 on page 27 for a complete list of products in each Herbicide Resistance Group.

## If Weed Resistance Develops on Your Farm

It is important to identify weed resistance before it spreads across your farm. Plan on conducting a "patch watch" scouting program this summer to identify suspicious patches before they become difficult to manage. Resistant weed patches have been identified on fields where producers were unaware of their existence.

Your patch watch program should begin shortly after spraying and continue through July after the crop has headed out and most weeds are visible from a distance. If you find suspicious looking patches, contact your local agricultural office or crop protection company representative to assist you in confirming weed resistance. If resistance is suspected:

1. Map the location of the patches and mark them with stakes so you will remember their location.
2. Mow, cultivate or spot spray the patches. Resistant patches should not be allowed to produce seed.
3. Patchy areas should NOT be harvested with the rest of the field. Harvest these areas separately, and make sure to clean all harvesting equipment before leaving the area to prevent the spread of seeds across the field or to a neighbouring field.
4. Check patches each year to monitor their spread. Keeping your resistant weeds isolated to a manageable patch is easier than dealing with an entire field of resistant weeds.

## Surfactants and Herbicide Registrations:

Registrations listed are strictly those listed on the adjuvant label. For adjuvants recommended for use with a specific product, see the product page.

| SURFACTANT | % Active ingredient | TYPE | REGISTERED HERBICDES |
|---|---|---|---|
| Agral 90 (PCP#11809 or 24725),<br>Agsurf (PCP#15881 or 27921) | 90 | Non-ionic | Accent, Ally, Escort, Everest, K2, Glyphosate, Gramoxone, Muster, Pinnacle, Pursuit, Prism, Refine Extra, Reflex, Reglone, Reward, Ultim, Unity |
| Citowett Plus (PCP#12766) | 50 | Non-ionic | Ally, atrazine, Basagran (peas), Escort, Muster, Pinnacle, Prism, Refine Extra, Unity |
| Companion (PCP#15882) | 70 | Non-ionic | Ally, Glyphosate, Muster, Refine Extra, Unity |
| Permax (PCP#22604) | 76 | Non-ionic | Ally, Glyphosate, Muster, Refine Extra, Reglone |
| Super Spreader (PCP#17402) | 50 | Non-ionic | Accent, Ally, atrazine, Basagran, Escort, Everest, Muster, Pinnacle, Prism, Refine Extra, Reflex, Ultim, Unity |
| LI700 (PCP#23026) | 80 | Non-ionic | Everest, Glyphosate |

* Note – some products are specific about the concentration of active ingredient in the surfactant for product performance. Check with the herbicide page in this guide or the product label.

## Oil-based Adjuvants and Herbicide Registrations:

| TRADE NAME | COMPOSITION | REGISTERED HERBICIDES |
|---|---|---|
| Adapt (XA oil Concentrate) (PCP#11769) | 83% paraffin based mineral oil<br>17% surfactant blend | Atrazine, Basagran |
| Amigo (PCP#22644) | 30% phosphate ester surfactant | Centurion*, Select* |
| Assist (PCP#16937) | 83% paraffin based mineral oil<br>17% surfactant blend | Basagran (all crops), Laddok |
| Corn oil (PCP#18473) | 99% paraffin based mineral oil<br>1% surfactant blend | Atrazine, linuron |
| Hasten (PCP#27420) | 77.4% methyl and ethyl oleate (esterified vegetable oil) | Option 35DF |
| Merge (PCP#24702) | 50% solvent<br>50% surfactant blend | Absolute, Elite*, FlaxMax, Muster Gold II*, Odyssey, Poast Ultra, Sundance* |
| Score (PCP#12200) | 83% paraffin based mineral oil<br>17% surfactant blend | Horizon*, Horizon BMT* |
| Sure-Mix (PCP#25467) | 60% paraffin based mineral oil<br>35.6% surfactant blend | Assure II*, Muster Gold II*, Refine Extra |
| Turbocharge (PCP#23135) | 50% mineral oil<br>39.5% surfactant blend | Achieve Liquid*, Prevail Liquid* |

* The adjuvant is packaged with the product.

## Adjuvants and Your Herbicide

Adjuvants are important ingredients in chemical weed control. Many herbicides must be applied with an adjuvant. If it is forgotten, the level of weed control can vary widely, and re-spraying may be necessary.

Most products have adjuvants built into the formulation (e.g. Puma). Other require adjuvant addition (e.g. Refine Extra). Some adjuvants were developed specifically for one herbicide, and these are either pre-packaged with the herbicide, or are identified by name on the label (e.g. Turbocharge for Achieve, Amigo for Select).

With some products, adjuvants need to be added only under certain conditions. For example, glyphosate products have built-in adjuvants, but require additional adjuvant when low rates (pre-seeding or chem-fallow), high water volumes, or certain tank mixes are used.

Adjuvants should be added only when required. If one is not required, addition can reduce weed control or injure crops. Product labels will describe when an adjuvant is required, and what type should be used.

There are two main classes of adjuvants: "activators or spray modifiers" (these include surfactants and crop oils), and "utility modifiers" (these include pH adjusters, water conditioners, low-drift adjuvants, and anti-foaming agents). The most important class of adjuvants is the activators. Surfactants, the main group within the activators, are *"surface active agents."* These chemicals produce effects at points where two substances touch, such as between two liquids (herbicide and water) or between a solid and a liquid (herbicide and leaf surface). Some surfactants act as dispersing agents, helping to keep a pesticide suspended in water. Others work on the plant, improving the wetting, sticking and penetrating characteristics of the herbicide droplets. Oil-based adjuvants contain petroleum or vegetable oil plus an emulsifier that suspends the oil in tiny droplets within the spray solution. Oil-based adjuvants typically assist in herbicide penetration into the leaf.

There are two basic type of surfactants (ionic and non-ionic), of which the non-ionic are most common. The tables on the previous page list the surfactants registered for use with herbicides in Western Canada.

## Crop and Herbicide Recommendation Tables

The ratings in the following charts give general comparisons based on rates, timing and other application instructions and precautions as outlined in this Guide.

The ratings for crop tolerance and weed control are explained below. Where ratings are not given, a dot (•) will indicate if the weed is listed on a product label. Where rate ranges are listed for controlling a given weed, ratings are based on results achieved with the higher rate.

| RATING | CROP TOLERANCE | WEED CONTROL |
|---|---|---|
| E - Excellent | Consistently exhibits a high degree of tolerance over a wide range of growing conditions. | Consistently provides a high degree of control over a wide range of growing conditions. |
| G - Good | Exhibits good crop tolerance under most growing conditions. | Provides good control under most growing conditions. |
| F - Fair | Tolerance is acceptable depending on growing conditions. | Control is acceptable depending on growing conditions. |
| P - Poor | | Provides suppression, but control is often unacceptable. |

All ratings are primarily based on the use of the herbicides on their own. Tank mixing herbicides may reduce the control of one or both tank mix partners, or result in a reduced level of crop safety.

# Weed Control Tables

## Table 1. Weed Control in Barley

| HERBICIDE | PAGE | Crop Tolerance | Barnyard Grass | Foxtail, Green and Yellow | Quackgrass | Volunteer Corn | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mallow, Round-leaved | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's Purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada | Volunteer Flax | Volunteer Mustard, Canola | Volunteer Sunflowers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-D | 47 | G | | | | | | | | P | | G | P | E | | G | E | | E | | G | E | F | E | P | P | | E | P |
| Achieve Liquid | 54 | G | F | G | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Achieve Liquid Gold | 56 | G | F | G | | | G | E | F | | | G | | G | | G | E | | E | G | G | G | G | G | P | P | | G | G |
| Ally Toss-N-Go + 2,4-D | 59 | G | | | | | | F | | G | | | | E | G | G | E | | E | E | G | E | G | E | F | F | | G | |
| Assert | 63 | E | | | | | G | P | | | | | | | | | | | G | | | | | G | | | | | |
| Attain | 68 | G | | | | | | G | | F | E | G | G$^{6}$ | E | F | E | E | E | E | E | G | E | G | E | P | P | E | E | • |
| Avadex BW/MicroActiv | 70 | E | | | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Avenge | 73 | G | | | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Bromoxynil | 78 | E | | | | | | G | | | | F | | | | F | G | | F | F | G | | G | F | | | | | |
| Bromoxynil + 2,4-D | 80 | E | | | | | | E | F | | | G | | E | | G | E | | E | G | G | G | G | G | | | | G | G |
| Bromoxynil + MCPA | 81 | E | | | | | | E | F | | | G | | G | | G | E | | E | G | G | G | G | G | P | P | | G | G |
| Curtail M | 87 | G | | | | | | G | | | | | G$^{6}$ | E | | P | E | | E | F | | E | F | E | G | G | | F | G |
| Dicamba +MCPA/2,4-D | 89 | F | | | | | | G | | | G | G | P | E | F$^{3}$ | G | E | | E | G | G | E | G | E | F | F | | G | F |
| Dicamba + mecoprop + MCPA | 91 | F | | | | | | G | G | | G | | | E | F | G | E | | E | G | G | E | G | E | F | [illegible] | | G | G |
| Dichlorprop + 2,4-D | 93 | G | | | | | | G | G | | | G | | E | | G | E | F | E | G | G | E | G | E | F | F | | G | G |
| DyVel | 96 | F | | | | | | G | | | F | G | | E | F | G | E | | E | G | G | E | G | E | F | F | | F | F |
| DyVel DSp | 97 | F | | | | | | G | | | F | G | | E | | G | E | F | E | G | G | E | G | E | F | F | | G | F |
| Express Pack | 110 | G | | | | | | F | | | | | | E | | G | E | | E | G | G | E | | E | | F | | | G |
| Fortress | 114 | G | | G | | | G | P | | | | | | | | P | P | | | P | P | | | | | | | | |
| Frontline | 119 | E | | | | | | E | | E | E | | F$^{11}$ | | G | • | E | | E | E | | E | E | E | F | F | | E | |
| Glyphosate (preharvest) | 128 | | | | G | | | | | | | G$^{8}$ | | | | | | | | | | | | | F | G | | | |
| Linuron + MCPA amine | 147 | F | | P | | | | G | | G | | G | | E | F | G | E | | E | G | | E | F | E | | | | | |
| Lontrel | 150 | E | | | | | | G | | | | | | | | | | | | | | | | | G | G | | | |
| MCPA | 152 | E | | | | | | | | | | G | P | E | F | F | E | | E | F | F | E | P | E | P | P | | | P |
| MCPA K | 152 | E | | | | | | | | | | G | | E | F | | E | | E | | | E | | E | P | P | | | |
| Mecoprop | 156 | G | | | | | | | | E | G | | | | | | E | | E | | | | | | | P | | | |
| Prestige | 170 | E | | | | | | E | | G | E | | G$^{6}$ | E | G | E | E | E | E | G | | E | G | E | E | E | E | E | E |
| Prevail Liquid | 171 | G | | G | | | G | G | | | | | G$^{6}$ | E | | P | E | | E | F | | E | F | E | G | G | | F | G |
| Puma$^{120}$ Super | 175 | G | G | E | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Refine Extra Toss-N-Go | 180 | E | | | | | | G | | E | F | | | E | E | G | E | F | E | E | E | G | E | E | F | F | | G$^{5}$ | G |
| Refine M | 182 | E | | | | | | G | | E | F | | | E | E | G | E | F | E | E | E | G | E | E | F | F | | G | G |
| Sencor | 189 | F | | | | | | | G | G | | | | | F | | G | | G | F | G | | G | G | | | | G | |
| Spectrum | 196 | E | | | | | | E | | E | E | | F$^{11}$ | E$^{6}$ | E | | E | | E | E | | E | E | E | G | G | | E | |
| Trifluralin (foxtail control) | 204 | E | | G | | | | | | | | | | | | | | | | | | | | | | | | | |
| Trifluralin (grassy and broadleaf) | 206 | F | G | G | | | F | F | | G | | | | | | | G | | | G | | | | | | | | | |
| Triton C$^{4}$ | 209 | E | | | | | | G | | E | • | | | E | E | G | E | F | E | E | E | G | E | E | F | F | | G$^{5}$ | G |
| Trophy | 211 | E | | | | | | F | | | G | G | | E | F | E | E | | E | E | | G | F | G | | | • | E | • |
| Unity[1] | 214 | E | | | | | | G | | G | G | | | G | E | G | G | | E | G | | G | G | E | | | | G | |

[1] Not for use in Manitoba. [2] 2,4-D mixes only. [3] MCPA K mixes only. [4] Feed barley only. [5] Will not control CLEARFIELD canola varieties. [6] Spring seedlings only. [8] Not registered for control with all glyphosate products. See glyphosate sections for details. [11] Seedlings and overwintered rosettes. • Ratings not yet developed.

## Table 2. Weed Control in Oats

| HERBICIDE | PAGE | Crop Tolerance | Barnyard Grass | Foxtail, Green and Yellow | Quackgrass | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mallow, Round-leaved | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's-purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada | Volunteer Flax | Volunteer Mustard, Canola | Volunteer Sunflowers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bromoxynil | 78 | E |  |  |  |  | G |  |  |  | F |  |  |  | F | G |  | F | F | G |  | G | F |  |  |  |  |  |
| Bromoxynil + MCPA | 81 | E |  |  |  |  | E | F |  |  | G |  | G |  | G | E |  | E | G | G | G | G | G | P | P |  | G | G |
| Curtail M | 87 | G |  |  |  |  | G |  |  |  |  | G[4] | E |  | P | E |  | E | F |  | E | F | E | G | G |  | F | G |
| Dicamba + MCPA | 89 | F |  |  |  |  | G |  |  | G | G | P | E | F[2] | G | E |  | E | G | G | E | G | E | F | F |  | G | F |
| Dicamba + mecoprop + MCPA | 91 | F |  |  |  |  | G | G |  | G |  |  | E | F | G | E |  | E | G | G | E | G | E | F | F |  | G | G |
| DyVel | 96 | F |  |  |  |  | G |  |  | F | G |  | E | F | G | E |  | E | G | G | E | G | E | F | F |  | F | F |
| Frontline | 119 | E |  |  |  |  | E |  | E | E |  | F[8] |  | G | • | E |  | E | E |  | E | E | E | F | F |  | E |  |
| Glyphosate (pre-harvest)[5] | 128 |  |  |  | G |  |  |  |  |  |  | G[6] |  |  |  |  |  |  |  |  |  |  |  | F | G |  |  |  |
| Linuron + MCPA amine | 147 | F |  | P |  |  | G |  | G |  | G |  | E | F | G | E |  | E | G |  | E | F | E |  |  |  |  |  |
| Lontrel | 150 | G |  |  |  |  | F |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | F | G |  |  |  |
| MCPA | 152 | E |  |  |  |  |  |  |  |  | G | P | E |  |  | E |  | E |  |  | E |  | E | P | P |  |  | P |
| MCPA K | 152 | E |  |  |  |  |  |  |  |  | G |  | E | F |  | E |  | E |  |  | E |  | E | P | P |  |  |  |
| Mecoprop | 156 | G |  |  |  |  |  |  | E | G |  |  |  |  |  | E |  | E |  |  |  |  |  |  | P |  |  |  |
| Refine Extra Toss-N-Go | 180 | G |  |  |  |  | G |  | E | F |  |  | E | E | G | E | F | E | E | E | G | E | E | F | F |  | G[3] | G |
| Refine M | 182 | E |  |  |  |  | G |  | E | F |  |  | E | E | G | E | F | E | E | E | G | E | E | F | F |  | G | G |
| Spectrum | 196 | E |  |  |  |  | E |  | E | E |  | F[8] | E[4] | E |  | E |  | E | E |  | E | E | E | G | G |  | E |  |

[2] MCPA K mixes only. [3] Will not control CLEARFIELD canola varieties. [4] Spring seedlings only. [5] Not all products registered for use in oat. See glyphosate sections for details. [6] Not registered for control with all products. See glyphosate sections for details. [8] Seedlings and overwintered rosettes. • Registered for control, ratings not yet developed.

## Table 3. Weed Control in Rye or Triticale

| HERBICIDE | PAGE | Crop Tolerance - Rye | Crop Tolerance - Triticale | Barnyard Grass | Foxtail, Green and Yellow | Quackgrass | Volunteer Corn | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mallow, Round-leaved | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's-purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada | Volunteer Flax | Volunteer Mustard, Canola | Volunteer Sunflowers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-D[3,4] | 47 | G |  |  |  |  |  |  |  |  | P |  | G | P | E |  | G | E |  | E |  | G | E | F | E | P | P |  | E | P |
| Achieve Liquid[3] | 54 | G | G | F | G |  |  | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Achieve Liquid Gold[1,4] | 56 | G |  | F | G |  |  | G | E | F |  |  | G |  | G |  | G | E |  | E | G | G | G | G | G | P | P |  | G | G |
| Avenge[1] | 73 | G | G |  |  |  |  | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bromoxynil[1] | 78 | E | E |  |  |  |  |  | G |  |  |  | F |  |  |  | F | G |  | F | F | G |  | G | F |  |  |  |  |  |
| Bromoxynil + MCPA[1,4] | 81 | E |  |  |  |  |  |  | E | F |  |  | G |  | G |  | G | E |  | E | G | G | G | G | G | P | P |  | G | G |
| Dicamba + 2,4-D[2,4] | 89 | F |  |  |  |  |  |  | G |  |  | G | G | P | E |  | G | E |  | E | G | G | E | G | E | F | F |  | G | F |
| MCPA[3,4] | 152 | E |  |  |  |  |  |  |  |  |  |  | G | P | E | F | F | E |  | E | F | F | E | P | E | P | P |  |  | P |

[1] Fall rye only. [2] Spring rye only. [3] Fall and Spring rye. [4] Rye only; not registered for triticale.

**Table 4. Weed Control in Winter Wheat**

| HERBICIDE | PAGE | Crop Tolerance | Barnyard Grass | Foxtail, Green and Yellow | Quackgrass | Volunteer Corn | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mallow, Round-leaved | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's-Purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada | Volunteer Flax | Volunteer Mustard, Canola | Volunteer Sunflowers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-D | 47 | G | | | | | | | | P | | G | P | E | | G | E | | E | | G | E | F | E | P | P | | E | P |
| Achieve Liquid | 54 | G | F | G | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Achieve Liquid Gold | 56 | G | F | G | | | G | E | F | | | G | | G | | G | E | | E | G | G | G | G | G | P | P | | G | G |
| Avenge[3] | 73 | G | | | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Bromoxynil | 78 | E | | | | | | G | | | | F | | | | F | G | | F | F | G | | G | F | | | | | |
| Bromoxynil + MCPA | 81 | E | | | | | | E | F | | | G | | G | | G | E | | E | G | G | G | G | G | P | P | | G | G |
| Dicamba + MCPA/2,4-D | 89 | F | | | | | | G | | | G | G | P | E | F[1] | G | E | | E | G | G | E | G | E | F | F | | G | F |
| Dicamba + mecoprop + MCPA | 91 | G | | | | | | G | G | | G | | | E | F | G | E | | E | G | G | E | G | E | F | F | | G | G |
| Dichlorprop + 2,4-D | 93 | G | | | | | | G | G | | | G | | E | | G | E | F | E | G | G | E | G | E | F | F | | G | G |
| DyVel | 96 | F | | | | | | G | | | F | G | | E | F | G | E | | E | G | G | E | G | E | F | F | | F | F |
| DyVel DSp | 97 | F | | | | | | G | | | F | G | | E | | G | E | F | E | G | G | E | G | E | F | F | | G | F |
| MCPA | 152 | E | | | | | | | | | | G | P | E | F | F | E | | E | F | F | E | P | E | P | P | | | P |
| Refine Extra Toss-N-Go | 180 | G | | | | | | G | | E | F | | | E | E | G | E | F | E | E | E | G | E | E | F | P | | G[2] | G |
| Sencor[3] | 189 | F | | | | | | | | | | | | F | | | | | | | | F | | G | | | | | |

[1] MCPA K mixes only. [2] Will not control CLEARFIELD canola varieties. [3] Norstar only.

## Table 5. Weed Control in Spring Wheat

| HERBICIDE | PAGE | Crop Tolerance | Barnyard Grass | Foxtail, Green and Yellow | Quackgrass | Volunteer Corn | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mallow, Round-leaved | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's-purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada | Volunteer Flax | Volunteer Mustard, Canola | Volunteer Sunflowers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-D | 47 | G | | | | | | | | P | | G | P | E | | G | E | | E | G | G | E | F | E | P | P | | E | |
| Achieve Liquid | 54 | G | F | G | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Achieve Liquid Gold | 56 | G | F | G | | | G | E | F | | | G | | G | | G | E | | E | G | G | G | G | G | P | P | | G | G |
| Adrenalin[11] | 57 | | • | •[1] | | | • | S | | • | S | • | • | • | S | • | • | | • | • | • | • | • | • | | | | • | |
| Ally Toss-N-Go + 2,4-D | 59 | G | | | | | | F | | G | | | | E | G | G | E | | E | E | G | E | G | E | F | F | | G | |
| Assert | 63 | G | | | | | G | P | | | | | | | | | | | G | | | | | G | | | | | |
| Attain | 68 | G | | | | | | G | | F | E | G | G[6] | E | F | E | E | E | E | E | G | E | G | E | P | P | E | E | • |
| Avadex BW/MicroActiv | 70 | G | | | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Avenge[7,8] | 73 | G | | | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Basagran + 2,4-D[7] | 75 | E | | | | | | | | • | | G | | | | | G | | E | F | G | E | | E | | | | E | |
| Bromoxynil | 78 | E | | | | | | G | | | | F | | | | F | G | | F | F | G | | G | F | | | | | |
| Bromoxynil + 2,4-D | 80 | E | | | | | | E | F | | | G | | E | | G | E | | E | G | G | G | G | G | | | | G | G |
| Bromoxynil + MCPA | 81 | E | | | | | | E | F | | | G | | G | | G | E | | E | G | G | G | G | G | P | P | | G | G |
| Curtail M | 87 | G | | | | | | G | | | | | G[6] | E | | P | E | | E | F | | E | F | E | G | G | | F | G |
| Dicamba + MCPA/2,4-D | 89 | G | | | | | | G | | | G | G | P | E | F[3] | G | E | | E | G | G | E | G | E | F | F | | G | F |
| Dicamba + mecoprop + MCPA | 91 | G | | | | | | G | G | | G | | | E | F | G | E | | E | G | G | E | G | E | F | F | | G | G |
| Dichlorprop + 2,4-D | 93 | G | | | | | | G | G | | | G | | E | | G | E | F | E | G | G | E | G | E | F | F | | G | G |
| DyVel | 96 | G | | | | | | G | | | F. | G | | E | F | G | E | | E | G | G | E | G | E | F | F | | F | F |
| DyVel DSp | 97 | G | | | | | | G | | | F | G | | E | | G | E | F | E | G | G | E | G | E | F | F | | G | F |
| Everest | 108 | F | | E[1] | | | G | | | | | | | | | | | | • | • | | • | • | | | | | •[5] | |
| Express Pack | 110 | G | | | | | | F | | | | | | E | | G | E | | E | G | G | E | | E | | F | | | G |
| Frontline | 119 | E | | | | | | E | | E | E | | F[2] | | G | | E | | E | E | | E | E | E | F | F | | E | |
| Frontline + 2,4-D | 118 | | | | | | | • | | • | • | • | •[2] | • | S | • | • | | • | • | • | • | • | • | S | S | | • | • |
| Glyphosate (preharvest) | 128 | | | | G | | | | | | | | G[4] | | | | | | | | | | | | F | G | | | |
| Harmony Total | 135 | G | G | G | | | E | G | | E | F | | | E | E | E | E | F | E | E | E | G | E | E | F | F | | G[5] | G |
| Horizon | 136 | G | E | G | | | E | | | | | | | | | | | | | | | | | | | | | | |
| Horizon BTM | 138 | G | E | G | | | E | E | F | | | G | | G | | G | E | | E | G | G | G | G | G | P | P | | G | G |
| K2[7] | 139 | F | | E[1] | | | G | G | | E | F | F | | E | E | E | E | F | E | E | E | E | G | E | F | F | | G[5] | G |
| Linuron + MCPA amine | 147 | F | | P | | | | G | | G | | G | | E | F | G | E | | E | G | | E | F | E | | | | | |
| Lontrel[7] | 150 | E | | | | | | G | | | | | | | | | | | | | | | | | F | G | | | |
| MCPA | 152 | E | | | | | | | | | | G | P | E | F[3] | | E | | E | | | E | | E | P | P | | | P |
| Mecoprop | 156 | G | | | | | | | | E | G | | | | | | E | | E | | | | | | | P | | | |
| Prestige | 170 | E | | | | | | E | | G | E | | G[6] | E | G | E | E | E | E | G | | E | G | E | E | E | E | E | G |
| Prevail Liquid | 171 | G | | G | | | G | F | | | | | G[6] | E | | P | E | | E | F | | E | F | E | F | G | | F | |
| Puma$^{120}$ Super | 175 | G | G | E | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Refine Extra Toss-N-Go | 180 | E | | | | | | G | | E | F | | | E | E | E | E | F | E | E | E | G | E | E | F | F | | G[5] | G |
| Refine M | 182 | E | | | | | | G | | E | F | | | E | E | E | E | F | E | E | E | G | E | E | F | F | | G | G |
| Sencor | 189 | F | | | | | | | G | G | | | | | F | | G | | G | F | G | | G | G | | | | G | |
| Spectrum | 196 | E | | | | | | E | | E | E | | F[2] | E[6] | E | | E | | E | E | | E | E | E | G | G | | E | |
| Sundance | 198 | G | | F | F | | G | | | E | E | | | | | | | | E | E | | | | E | | | | G[5] | |
| Trifluralin (foxtail control) | 204 | E | | G | | | | | | | | | | | | | | | | | | | | | | | | | |
| Triton C | 209 | E | | | | | | G | | E | • | | | E | E | E | E | F | E | E | E | G | E | E | F | F | | G[5] | G |
| Trophy | 211 | E | | | | | | | | | G | G | | E | F | E | E | | E | E | | G | F | G | | | E | E | • |
| Unity[9] | 214 | E | | | | | | G | | G | G | | | G | E | G | G | | E | G | | G | G | E | | | | G | |

[1] Green foxtail only. [2] Spring seedlings and overwintered rosettes. [3] MCPA K mixes only. [4] Not registered for control with all products. See glyphosate sections for details. [5] Will not control CLEARFIELD canola varieties. [6] Spring seedlings only. [7] Not registered for durum wheat. [8] Not recommended for all spring wheat varieties. Check product listing for details. [9] Not for use in Manitoba. [10] Tank mix with 2,4-D ester when applying to durum wheat. [11] For use on CLEARFIELD wheat varieties only.

• Registered for control, ratings not yet developed. S - Suppression

## Table 6. Weed Control in Corn

| HERBICIDE | PAGE | Barnyard Grass | Volunteer Cereals | Foxtail, Green | Foxtail, Yellow | Wild Oats | Quackgrass | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Kochia | Lamb's-quarters | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's-purse | Smartweed Annual Species, Lady's-thumb | Sow Thistle (Perennial) | Stinkweed | Sunflower, Volunteer | Thistle, Canada | Volunteer Canola |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-D | 47 | | | | | | | | | P. | | G | P | E | G | E | E | G | G | E | F | P | E | P | P | E |
| Accent | 52 | • | | • | S | • | • | | | | | | | | | | | | | | | | | | | |
| Atrazine | 66 | | | | | • | | • | | | | | | | | • | • | • | | | • | | | | | |
| Basagran/Basagran Forté | 75 | | | | | | | | | • | | • | | | | • | • | S | S | • | • | | • | | S | • |
| Bromoxynil | 78 | | | | | | | G | | | | F | | | F | G | F | F | G | | G | | F | | | |
| Bromoxynil + MCPA | 81 | | | | | | | • | • | | | • | | • | • | • | • | • | • | • | • | | • | • | | • |
| Dicamba | 89 | | | | | | | • | | | • | | | | • | • | • | • | | | • | S | | | S | |
| Dicamba + 2,4-D amine | 89 | | | | | | | • | | | • | • | S | • | • | • | • | • | • | • | • | S | • | • | S | • |
| Dual II Magnum | 95 | • | | • | • | | | | | | | | | | | | | S | | | | | | | | |
| DyVel DSp | 97 | | | | | | | G | | | F | G | | E | G | E | E | G | G | E | G | F | E | | F | G |
| Eradicane | 105 | • | • | • | • | • | S | | | • | | | | | | • | | • | | | | | | | | |
| Frontier | 116 | | | • | | | | | | | | | | | | | | | | | | | | | | |
| Glyphosate[1, 4] | 130 | E | E | E | E | E | F | G | G | E | E | | F | E | E | E | E | E | E | E | E | F | E | E | F | |
| Laddok | 142 | | | | | | | | | • | | • | | | | • | • | • | • | | • | | | | | |
| Liberty 200 SN[3] | 146 | • | | • | • | • | S | • | | • | | • | | | | • | • | • | | • | • | • | • | | S | |
| MCPB + MCPA | 155 | | | | | | | | | | | | | | | • | • | • | | • | | S | • | | S | • |
| Option 35 DF[5] | 163 | • | | • | • | | | | | • | | | | | | • | • | • | | | | | | | | |
| Primextra II Magnum | 172 | • | | • | • | | | • | | | | | | | | • | • | • | | | • | | | | | |
| Shotgun | 192 | | | | | | | • | | | | | | | | • | • | • | | | • | | | | | |
| Ultim[2] | 212 | • | • | • | • | • | • | | | | | | | | | | | • | | | | | | | | |

• Controlled S – Suppression

[1] For use on Roundup Ready varieties only. [2] See product page for registered corn varieties. [3] For use on Liberty 200 SN tolerant corn varieties.
[4] Not all glyphosate products are registered for use on Roundup Ready Corn. [5] Registered for use only in Manitoba.

## Table 7. Weed Control in Peas

| HERBICIDE | PAGE | Crop Tolerance | Barnyard Grass | Foxtail, Green and Yellow | Quackgrass | Volunteer Barley | Volunteer Wheat | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp Nettle | Kochia | Lamb's-quarters | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's-purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assure II | 65 | E | G | E | F | E | E | G | | | | | | | | | | | | | | | | | | |
| Avadex BW | 70 | E | | | | | | G | | | | | | | | | | | | | | | | | | |
| Basagran/Basagran Forté | 75 | F | | | | | | | | | F | F | F | | | | | F | F | P | F | F | F | F | | P |
| Clethodim | 85 | E | E | E | F | E | E | G | | | | | | | | | | | | | | | | | | |
| Edge | 101 | G | E | E | | P | F | G | G | | G | P | | | | P | G | E | | G | P | | P | | | |
| Fusion | 121 | E | G | E[1] | | E | E | G | | | | | | | | | | | | | | | | | | |
| Glyphosate (preharvest) | 128 | | | | G | | | | | | | | | G[2] | | | | | | | | | | | F | G |
| MCPA Sodium Salt/Amine | 152 | F | | | | | | | | | | | | | P | | | P | G | | | P | | P | | |
| MCPB + MCPA | 155 | F | | | | | | | | | | | | | | F | | G | G | G | | G | | G | P | P |
| Odyssey | 160 | G | G | E[1] | | G | G | G | F | | E | E | | | E | F | P | P | E | E | E | E | G | E | | |
| Odyssey DLX | 161 | | • | •[1] | | • | • | • | F | | E | E | | | E | F | P | P | E | E | E | E | G | E | | |
| Poast Ultra | 166 | E | E | E | F | E | E | G | | | | | | | | | | | | | | | | | | |
| Pursuit | 177 | G | | F[1] | | | | F | G | | G | G | | | | G | | P | E | G | | G | G | E | | |
| Pursuit Ultra | 179 | G | E | E | F | E | E | G | F | | G | G | | | | F | | | E | G | | | F | G | | |
| Sencor | 189 | F | | | | | | | | | G | | | | | F | | G | G | | | | G | G | | |
| Solo | 195 | | • | •[1] | | • | • | • | S | | | S | | | | | S | • | • | • | | • | • | • | | |
| Trifluralin (broadleaf & grassy weeds) | 206 | G | G | G | | | | F | F | | G | | | | | | | G | | G | G | | | | | |
| Venture L | 217 | E | E | F | F | E | E | G | | | | | | | | | | | | | | | | | | |

[1] Green foxtail only. • Registered for control, ratings not yet developed. S – Suppression
[2] Not registered for control with all products. See glyphosate sections for details.

## Table 8. Weed Control in Other Pulses

| | | CROP | | | | | | ANNUAL WEEDS | | | | | | | | | | | | | | | | | | | | PERENNIALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HERBICIDE** | PAGE | Bean, Dry | Fababean | Lentil | Chickpea | Soybean | Sweet White Lupin | Barnyard Grass | Foxtail, Green | Foxtail, Yellow | Volunteer Barley | Volunteer Wheat | Wild Oat | Buckwheat, Wild | Chickweed | Cleavers | Cocklebur | Hemp-nettle | Kochia | Lamb's-quarters | Mustard, Wild | Nightshade, Hairy | Pigweed, Redroot | Russian Thistle | Shepherd's Purse | Smartweed, Annual Species | Stinkweed | Canada Thistle | Dandelion | Perennial Sow-thistle | Quackgrass |
| Assure II | 65 | $X^6$ | | X | | X | | G | E | • | E | E | G | | | | | | | | | | | | | | | | | | F |
| Basagran/Basagran Forté | 75 | $X^1$ | X | | | X | | | | | | | | | F | F | F | | | F | F | F | P | F | F | F | F | P | | | |
| Clethodim | 85 | X | | X | X | X | | E | E | E | E | E | G | | | | | | | | | | | | | | | | | | |
| Dual II Magnum | 95 | $X^7$ | | | | X | X | G | G | G | | | | | | | | | | | | | P | | | | | | | | |
| Edge | 101 | $X^1$ | X | $X^8$ | | X | | E | E | E | P | F | G | G | G | P | | P | G | E | | | G | P | | P | | | | | |
| Eptam | 103 | X | | | | | | G | G | G | F | F | G | | G | | | | | G | | | G | | | | | | | | |
| Frontier | 116 | $X^1$ | | | | | | | • | | | | | | | | | | | | | | | | | | | | | | |
| Fusion | 121 | | | X | | | | G | E | | E | E | G | | | | | | | | | | | | | | | | | | |
| Glyphosate (preharvest)[4] | 128 | X | | X | | X | | | | | | | | | | | | | | | | | | | | | | G | $G^4$ | F | G |
| Liberty (desiccant only) | 143 | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Linuron | 147 | | | | | $X^2$ | $X^2$ | S | S | S | | | | • | • | | | | | | | | • | | • | • | • | | | | |
| Pinnacle | 165 | | | | | X | | | | | | | | | | | | | | • | • | | • | | | • | | | | | |
| Poast Ultra | 166 | X | X | X | X | X | | E | E | E | E | E | G | | | | | | | | | | | | | | | | | | F |
| Pursuit | 177 | $X^3$ | | | | X | | | | | | | | | | | | | | | | G | | | | | | | | | |
| Reflex + Basagran | 183 | $X^5$ | | | | | | | | | | | | | F | | | | | • | • | | • | | • | • | • | | | | |
| Sencor (post-emergence) | 189 | | | X | X | | | | | | | | | | F | | | F | | F | F | | | | | F | F | | | | |
| Sencor + Treflan (PPI) | 189 | | X | | | X | | G | G | G | | | F | F | G | | | F | | G | G | | G | G | G | G | G | | | | |
| Sencor + Edge (PPI) | 189 | | X | | | | | G | E | E | F | F | G | G | G | F | | F | G | E | F | | G | F | | G | F | | | | |
| Trifluralin (broadleaf and grassy weeds)[4] | 206 | X | X | X | | X | | G | G | G | | | F | F | G | | | | | G | | | G | G | | | | | | | |
| Venture L | 217 | | | X | | X | | E | F | F | E | E | G | | | | | | | | | | | | | | | | | | F |

[1] White and kidney beans only. [2] Pre-emergent surface treatments only. [3] Pinto, pink and red beans only. (Refer to Pursuit section for full list of weeds controlled).
[4] Not registered for control with all products. See product section for details. [5] For use on navy beans in the Red River Valley of Manitoba. Does not include Basagran Forté.
[6] Navy and pinto beans only. [7] White, kidney and pinto beans only. [8] Fall applications only. • Registered for control, ratings not yet developed.
S - Suppression.

## Table 9. Weed Control in Flax and Solin (Low Linolenic Acid Varieties). Not all products are registered for use on Solin.

| HERBICIDE | PAGE | Crop Tolerance | Barnyard Grass | Foxtail, Green | Foxtail, Yellow | Quackgrass | Volunteer Cereals | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp Nettle | Kochia | Lamb's-quarters | Mallow, Round-leaved | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's-purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assure II[1] | 65 | E | G | E | • | F | E | G | | | | | | | | | | | | | | | | | | | |
| Avadex BW | 70 | E | | | | | | G | | | | | | | | | | | | | | | | | | | |
| Basagran[1]/Basagran Forté | 75 | F | | | | | | | | | F | F | F | | | | | F | | F | P | F | F | F | F | | F |
| Bromoxynil[1] | 78 | F | | | | | | | G | | | | F | | | | F | G | | F | F | G | | G | F | | |
| Bromoxynil + MCPA[1] | 81 | F | | | | | | | E | F | | | G | | G | | G | E | | E | | G | G | F | G | P | P |
| Clethodim[1] | 85 | E | E | E | E | F | E | G | | | | | | | | | | | | | | | | | | | |
| Curtail M[1] | 87 | | | | | | | | F | | | | | G[2] | E | | | E | | E | P | | E | P | E | G | G |
| Elite[1] | 102 | | • | • | • | • | • | • | • | • | | | • | | • | | • | • | | • | | • | • | • | • | • | • |
| Eptam[3] | 103 | F | G | G | G | | F | G | | | G | | | | | | | G | | | G | | | | | | |
| FlaxMax | 113 | F | E | E | E | | G | G | F | | | | | G[2] | E | | | E | | E | P | | E | P | E | G | G |
| Fusion[1] | 121 | E | G | E | | | E | G | | | | | | | | | | | | | | | | | | | |
| Glyphosate (preharvest)[4] | 128 | | | | | G | | | | | | | | G[5] | | | | | | | | | | | | F | G |
| Lontrel[1] | 150 | E | | | | | | | G | | | | | | | | | | | | | | | | | F | G |
| MCPA/MCPA K | 152 | F | | | | | | | | | | | G | P | E | F | | E | | E | | | E | • | E | P | P |
| Poast Ultra | 166 | E | E | E | E | F | E | G | | | | | | | | | | | | | | | | | | | |
| Trifluralin (broadleaf and grassy weeds)[6] | 206 | F | G | G | G | | | F | F | | G | | | | | | | G | | | G | G | | | | | |
| Venture L[1] | 217 | E | E | F | F | F | E | G | | | | | | | | | | | | | | | | | | | |

[1] Registered for use on Solin (low linolenic acid varieties). [2] Spring seedlings only. [3] Not recommended for use on flax in Saskatchewan. [4] Not all products registered for use in flax. See glyphosate sections for details. [5] Not registered for control with all products. See glyphosate sections for details. [6] Fall application only.

## Table 10. Weed Control in Canola

| HERBICIDE | PAGE | Crop Tolerance | Barnyard Grass | Foxtail, Green | Foxtail, Yellow | Quackgrass | Volunteer Barley | Volunteer Wheat | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mallow, Round-leaved | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's Purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Absolute[2] | 51 | G | G | E |  |  | G | G | G | G |  | E | G |  |  | E | E | P | P |  | E | E | E | E | G | E | G | G |
| Assure II | 65 | E | G | E | • | F | E | E | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Avadex BW | 70 | E |  |  |  |  |  |  | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Clethodim | 85 | E | E | E | E | F | E | E | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eclipse[4] | 100 | G |  | E |  | F | E | E | E | G | G | E | E |  | F |  | E | E | E |  | E | E | E | E | • | E | G[7] | G[7] |
| Edge | 101 | G | E | E | E |  | P | F | G | G |  | G | P |  |  |  | P | G | E |  |  | E | P |  | P |  |  |  |
| Fusion | 121 | E | G | E |  |  | E | E | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Glyphosate[4,5] | 129 | E | E | E | E | F | E | E | E | F | G | E | E |  | F | E | E | E | E | G | E | E | E | E | E | E | F | F |
| Glyphosate (preharvest) | 128 |  |  |  |  | G |  |  |  |  |  |  |  |  | G[5] |  |  |  |  |  |  |  |  |  |  |  | F | G |
| Liberty[1] | 143 | G | G | G |  | F | F[3] | G[3] | G | G |  | G | G |  | F | G | G | G | G | G | G | G | G | G | G | G | G | F |
| Lontrel | 150 | G |  |  |  |  |  |  |  | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | F | G |
| Muster Gold II | 157 | G | G | E | • | F | E | E | G |  |  |  |  |  |  | G | G |  |  |  | G | P |  |  | G | F |  |  |
| Muster Toss-N-Go | 158 | G |  |  |  |  |  |  |  |  |  |  |  |  |  | G | G |  |  |  | G | P |  |  | G | F |  |  |
| Odyssey[2] | 160 | G | G | E |  |  | G | G | G | F |  | E | E |  |  | E | G | P | P |  | E | E | E | E | G | E |  |  |
| Poast Ultra | 166 | E | E | E | E | F | E | E | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pursuit[2] | 177 | E |  | G |  |  | P | P | F | G |  | G | G |  |  |  |  |  | P |  | E | G |  |  | G | E |  |  |
| Pursuit Ultra[2] | 179 | E | E | E | E | F | E | E | G | F |  | G | G |  |  |  | F |  |  |  | E | G |  |  | F | G |  |  |
| Solo[2] | 195 |  | • | • |  |  | • | • | • | S |  |  | S |  |  |  |  | S | • |  | • | • |  | • | • | • |  |  |
| Trifluralin | 206 | E | G | G | G |  |  |  | F | F |  | G |  |  |  |  |  |  | G |  |  | G | G |  |  |  |  |  |
| Venture L | 217 | E | E | F | F | F | E | E | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

[1] For use only on Liberty Link varieties. [2] For use only on CLEARFIELD canola varieties. [3] Ratings based on 1.35 L/acre rate of Liberty. Control may be reduced at lower rates. [4] For use only on Roundup Ready canola varieties. [5] Not registered for control with all products. See glyphosate sections for details. [7] Season long control.
• Registered for control, ratings not yet developed. S – Suppression.

## Table 11. Weed Control in Potatoes*

| HERBICIDE | PAGE | Barnyard Grass | Foxtail, Green and Yellow | Volunteer Canola | Volunteer Corn | Volunteer Barley | Volunteer Wheat | Wild Oats | Quackgrass | Chickweed | Dandelion | Hemp-nettle | Lamb's-quarters | Mustard, Wild | Pigweed, Redroot | Pigweed, Prostrate | Purslane | Smartweed (Annual) | Shepherd's-purse | Stinkweed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clethodim | 85 | • | • |  | • | • | • | • |  |  |  |  |  |  |  |  |  |  |  |  |
| Dual II Magnum | 95 | • | • |  |  |  |  |  |  |  |  |  |  |  | S |  |  |  |  |  |
| Eptam 8-E | 103 | • | • |  |  | • | • | • | S | • |  |  | • |  | • | • | • |  |  |  |
| Glyphosate (preplant use only) | 123 |  | • | •[1] | •[1] | • | • | • | • |  | • | • | • | • | • |  |  | • | • | • |
| Liberty (desiccant only) | 143 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Linuron (pre-emergent use only) | 147 | S | • |  |  |  |  |  |  | • |  |  | • |  | • | • | • | • | • | • |
| Poast Ultra | 166 | • | • |  | • | • | • | • | S |  |  |  |  |  |  |  |  |  |  |  |
| Prism | 174 | • | • |  |  |  |  |  | • |  |  |  | S |  | • |  |  |  |  |  |
| Reglone Desiccant | 184 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sencor | 189 |  |  | • |  |  |  |  |  | • |  | • | • | • | • |  |  | • | • | • |
| Venture L | 217 | • | • |  | • | • | • | • | S |  |  |  |  |  |  |  |  |  |  |  |

• Controlled S – Suppression [1] Will control non-Roundup Ready varieties only.
*Note: Before using any pesticides on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

## Table 12. Weed Control in Sunflowers

| HERBICIDE | PAGE | Crop Tolerance | Barnyard Grass | Foxtail, Green and Yellow | Quackgrass | Volunteer Barley | Volunteer Wheat | Wild Oats | Buckwheat, Wild | Catchfly, Night-flowering | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mallow, Round-leaved | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assert | 63 | F | | | | | | | | | | | | | | | | | | G | | | | G | | |
| Clethodim | 85 | E | E | E | F | E | E | G | | | | | | | | | | | | | | | | | | |
| Edge | 101 | G | E | E | | P | F | G | G | | G | P | | | | P | G | E | | | E | P | P | | | |
| Eptam 8E | 103 | G | G | G | | F | F | G | | | G | | | | | | | G | | | G | | | | | |
| Poast Ultra | 166 | E | E | E | S | • | • | G | | | | | | | | | | | | | | | | | | |
| Trifluralin | 206 | E | G | G | | | | F | F | | G | | | | | | | G | | | G | G | | | | |
| Venture L | 217 | E | E | F | F | E | E | G | | | | | | | | | | | | | | | | | | |

• Registered for control, ratings not yet developed. S - Suppression.

## Table 13. Weed Control in Special Crops

| | CROP | | | | | | | ANNUAL WEEDS | | | | | | | | | | | | | | | | | | | | | | | PERENNIALS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HERBICIDE | PAGE | Canaryseed | Safflower | Caraway | Coriander | Buckwheat | Mustard | Barnyard Grass | Foxtail, Green | Foxtail, Yellow | Volunteer Wheat | Wild Oat | Buckwheat, Wild | Catchfly, night-flowering | Chickweed | Cleavers | Cocklebur | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mustard, Wild | Pigweed, Redroot | Russian Thistle | Shepherd's Purse | Smartweed, Annual Species | Stinkweed | Volunteer Barley | Volunteer Flax | Volunteer Mustard, Canola | Canada Thistle | Dandelion | Perennial Sow-thistle | Quackgrass |
| Avadex BW | 70 | ✓[1] | | | | | ✓ | | | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Avenge | 73 | ✓ | | | | | | | | | | G | | | | | | | | | | | | | | | | | | | | | | |
| Bromoxynil | 78 | ✓ | | | | | | | | | | | G | | | | F | | | F | G | F | F | G | | G | F | | | | | | | |
| Bromoxynil + MCPA | 81 | ✓ | | | | | | | | | | | E | F | | | G | G | | G | E | E | G | G | G | G | G | | | G | P | | P | |
| Clethodim | 85 | | | | | | ✓ | E | E | E | E | G | | | | | | | | | | | | | | | | E | | | | | | F |
| Curtail M | 87 | ✓ | | | | | | | | | | | F | | | | | E | | P | E | E | P | | E | P | E | | | F | G | G[4] | G | |
| Dicamba + MCPA | 89 | ✓ | | | | | | | | | | | G | | | G | G | E | F | | E | E | G | G | E | G | E | | P | G | F | P | F | |
| Dicamba + Mecoprop + MCPA | 91 | ✓ | | | | | | | | | | | G | G | | G | | E | F | G | E | E | G | G | E | G | E | | | | F | | F | |
| Edge | 101 | | ✓ | ✓ | ✓ | | ✓[2] | E | E | E | F | G | G | | G | P | | | P | G | E | | G | P | | P | | P | | | | | | |
| Fusion | 121 | | | | | | ✓ | G | E | | • | G | | | | | | | | | | | | | | | | | | | | | | • |
| Muster Toss-n-Go | 158 | | | | | | ✓[3] | | | | | | | | | | | G | G | | | G | | | | G | F | | | | | | | |
| Poast Ultra | 166 | | ✓ | ✓ | ✓ | ✓ | ✓ | E | E | E | E | G | | | | | | | | | | | | | | | | E | | | | | | F |
| Prestige | 170 | ✓ | | | | | | | | | | | E | | G | E | | E | G | E | E | E | G | | E | G | E | | E | E | E | G[4] | E | |
| Trifluralin | 206 | | ✓ | | | | ✓ | G | G | G | | F | F | | G | | | | | | G | | G | G | | | | | | | | | | |
| Trophy | 211 | ✓ | | | | | | | | | | | S | | | • | • | • | • | • | • | • | | | • | S | • | | • | • | | | | |
| Venture L | 217 | | | | | | ✓ | E | F | F | E | G | | | | | | | | | | | | | | | | E | | | | | | F |

[1] Granular formulation only. [2] Yellow mustard only. [3] Brown and oriental only. [4] Spring seedlings only.

• Registered for control, ratings not yet developed. S - Suppression.

## Table 14a. Herbicides for Use Before Seeding or After Seeding but Prior to Crop Emergence

| HERBICIDE | RATE L/acre | Pre-seeding | Pre-emergent | Barley | Canaryseed | Canola | Chickpea | Corn, Field | Corn, Sweet | Dry Beans | Field Pea | Flax | Forage Grasses | Lentil | Oats | Rye | Soybean | Wheat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amitrol | 1.7 | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | ✓ | | | | | | ✓ | ✓ |
| Glyphosate | glyphosate[1] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Glyphosate + Express TNG | glyphosate[1] + 4 g | ✓ | | ✓ | | | | | | | | | | | ✓ | | | ✓ |
| Glyphosate + Pardner | glyphosate[1] + 0.51 | ✓ | ✓ | ✓ | | | | | | | | | | | ✓ | | | ✓ |
| Prepass | 40 acres/case | ✓ | | ✓ | | | | | | | | | | | ✓ | | | ✓ |
| Glyphosate + 2,4-D | glyphosate[1] + 0.23-0.58 | ✓ | ✓ | ✓ | | | | | | | | | | | | ✓ | | ✓ |
| Glyphosate + Buctril M | glyphosate[1] + 0.2-0.4 | ✓ | | ✓ | ✓ | | | ✓ | ✓ | | | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| Glyphosate + MCPA | glyphosate[1] + 0.2-0.28 | ✓ | | ✓ | | | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| Glyphosate + MCPA | glyphosate[1] + 0.2-0.4 | ✓ | | ✓ | | | | ✓ | ✓ | | | ✓ | | | ✓ | ✓ | | ✓ |
| Rustler | 1.0-1.3 | ✓ | | ✓ | | | | ✓ | | | | | | | ✓ | ✓ | | ✓ |

[1] Rates of application of glyphosate vary among brands. Consult Table 10 on page 131 for specific application rates of glyphosate.

## Table 14b. Weed Control Before Seeding or After Seeding but Prior to Crop Emergence

| HERBICIDE | RATE L/acre | PAGE | Brome, Downy | Buckwheat, Wild | Dandelion | Flixweed | Foxtail Barley | Foxtail, Green | Hemp-nettle | Kochia | Lady's-thumb | Lamb's-quarters | Mustard, Wild | Narrow-leaved Hawk's Beard | Pigweed, Redroot | Quackgrass | Russian Thistle | Shepherd's Purse | Stinkweed | Volunteer Cereals | Volunteer Canola (including Roundup Ready varieties) | Volunteer Flax | Wild Oats |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amitrol 240 | 1.7 L | 61 | | | • | | | | | | | | | | | | | | | | | | |
| Glyphosate[1] + 2,4-D | glyphosate[1] + 0.23-0.58 | 123 | • | • | | • | | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | • |
| Glyphosate[1] + Buctril M | glyphosate[1] + 0.2-0.4 | 123 | • | • | | • | | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | • |
| Glyphosate + Express TNG | glyphosate[1] + 4 g | 123 | | • | • | • | S | • | • | • | | • | • | S | • | | • | • | • | • | | | • |
| Glyphosate[1] + MCPA | glyphosate[1] + 0.2-0.4 | 123 | • | • | | • | | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | • |
| Glyphosate + Pardner | glyphosate[1] + 0.51 | 123 | | • | | | | • | | • | • | • | • | | | | • | | • | • | • | | • |
| Glyphosate | glyphosate[1] | 123 | • | • | S | • | S | • | • | • | • | • | • | • | • | • | • | • | • | • | | • | • |
| Prepass | 40 acres/case | 168 | • | • | S | • | | • | • | S | • | • | • | • | • | | • | • | • | • | • | | • |
| Rustler | 1.0-1.3 | 188 | • | • | | • | | • | | • | • | • | • | | • | | • | | • | • | | | • |

• Controlled S – Suppression [1] Rates of application of glyphosate vary among brands. Consult Table 10 on page 131 for specific application rates of glyphosate.

## Table 15. Weed Control in Summerfallow (Chem Fallow)

| HERBICIDE | RATE L/acre | PAGE | Brome, Downy | Buckwheat, Wild | Dandelion | Flixweed | Foxtail Barley | Foxtail, Green | Kochia | Lady's-thumb | Lamb's-quarters | Mustard, Wild | Pigweed, Redroot | Quackgrass | Russian Thistle | Stinkweed | Thistle, Canada | Thistle, Sow (Perennial) | Volunteer Cereals | Volunteer Canola | Wild Oats |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dicamba + 2,4-D | 0.12 + 0.45 | 89 | | • | | • | | | • | • | • | • | • | | • | • | S | S | | | |
| Dicamba + mecoprop + MCPA | 0.81 | 91 | | • | | • | | | • | • | • | • | • | | • | • | S | S | | • | |
| DyVel DSp | 0.71 | 97 | | • | | • | | | • | • | • | • | • | | • | • | S | | | • | |
| Express Pack | 40 acres/pack | 110 | | | | • | | | | | | | | | | • | | | | | |
| Glyphosate | 0.5-1.0 | 123 | • | • | | • | S | • | • | • | • | • | • | | • | • | | | • | •[2] | • |
| Glyphosate + 2,4-D amine (500 g/L) | glyphosate[3] + 0.49 | 123 | | | | • | | • | • | • | S | • | • | | S | • | | | • | • | • |
| Glyphosate + dicamba | glyphosate[3] + 0.12 | 123 | | S | | • | | • | • | • | • | • | S | | • | • | | | • | •[2] | • |
| Glyphosate + bromoxynil | glyphosate[3] + 0.51 | 123 | | • | | | | • | S | • | | • | S | | | • | | | • | • | S |
| Lontrel | 0.34 | 150 | | • | | | | | | | | | | | | | • | S | | | |
| Rustler | 1.0-1.3 | 188 | • | • | | • | S | • | • | • | • | • | • | | • | • | | | • | •[2] | • |

• Controlled S – Suppression [2] Not including Roundup Ready canola. [3] Rates of application of glyphosate vary among brands. Consult Table 10 on page 131 for specific application rates of glyphosate.

## Table 16. Fall Weed Control in Stubble

| HERBICIDE | PAGE | Flixweed | Narrow-leaved Hawk's Beard | Shepherd's-purse | Stinkweed | Canada Thistle | Quackgrass | Dandelion |
|---|---|---|---|---|---|---|---|---|
| 2,4-D | 47 | • | | • | • | S | | S |
| Amitrol 240 | 61 | | | | | S | | |
| Dicamba | 89 | | | | | S | | S |
| Dicamba + Glyphosate | 89 | • | | • | • | S | S | |
| Dicamba + mecoprop + MCPA | 91 | • | | • | • | S | | |
| DyVel DSp | 97 | • | | • | • | S | | |
| Glyphosate | 123 | | | | | S | • | • |
| MCPA | 152 | • | | • | • | S | | S |

• Controls fall seedlings less than 2 inches (5 cm) across.
S – Suppression. Levels of suppression vary depending on the product and growing conditions in the fall. Regrowth and in-crop treatments can be expected.

## Table 17. Weed Control in Grass Pastures and Hayfields

| HERBICIDE | RATE L/acre or kg/acre | PAGE | Absinth | Bindweed, Field | Burdock | Canada Thistle | Dandelion | Dock, Curled | Daisy, English | Flixweed | Foxtail Barley | Gumweed | Hawk's Beard, Narrow-leaved | Knapweed | Leafy Spurge | Nodding Thistle | Poplar | Pussy Toes | Red Bartsia | Sage, Pasture | Sow-thistle, Perennial | Snowberry | Stinkweed | Tansy | Wild Rose | Willow | Wormwood, Biennial |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-D (500 g/L) | 0.57 - 1.82 | 47 | □ | □ | • | □ | □ | • | | • | | □ | | | □ | □ | □ | □ | • | □ | □ | □ | • | | | | |
| 2,4-DB | 0.71 - 1.72 | 49 | | □ | | □ | | ■ | | | | | ■ | | | | | | | | □ | | • | | | | |
| Dicamba | 0.85 - 1.86 | 89 | | □ | | □ | □ | □ | □ | | | | | □ | □ | | | | | □ | □ | | | □ | | | |
| Dicamba + 2,4-D | 0.85 + 0.89 - 1.62 | 89 | □ | □ | • | □ | □ | □ | □ | • | | □ | | | □ | □ | □ | | • | □ | □ | • | • | □ | • | □ | |
| Escort | 0.010 - 0.012 | 106 | | | | □ | • | | | | | | | | | | | | | | □ | • | | • | ■ | | |
| Grazon | 2.8 | 134 | | | • | • | • | • | | | | | | | | | | | | | | | | | | | |
| Kerb | 0.36 - 0.45 | 140 | | | | | | | | | • | | | | | | | | | | | | | | | | |
| MCPA (500 g/L) | 0.7 - 1.9 | 152 | | □ | | □ | □ | □ | | • | | □ | | | ■ | | | | | | □ | | • | □ | | | • |
| MCPB + MCPA | 1.11 - 1.72 | 155 | | □ | | | | | | | | | | | | | | | | | □ | | • | | | | |
| Remedy EC | 1 - 8 | 186 | | ■ | • | | • | • | | | | • | | | | | • | | | | | | | | • | • | |
| Tordon 22K | 0.45 - 3.64 | 200 | | ■ | | • | | | | | | | | • | ■ | | | | | • | | | | | | | |

• Controlled. ■ Controlled by the highest rate within this range. □ Top growth suppression.

## Table 18. Weed Control in Shelterbelts

| HERBICIDE | USE | | | | SHELTERBELT SPECIES | | | | | | | | | | | | WEEDS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PAGE | Before Planting | After Planting (New & Established) | Established | American Elm | Birch | Caragana | Crabapple | Green Ash | Juniper | Lilac | Manitoba Maple | Poplar | Scots Pine | Siberian Elm | Willow | Barnyard Grass | Foxtail, Green and Yellow | Wild Oats | Buckwheat, Wild | Chickweed | Cleavers | Cocklebur | Dandelion | Flixweed | Hemp-nettle | Kochia | Lamb's-quarters | Mustard, Wild | Pigweed, Red Root | Quackgrass | Russian Thistle | Shepherd's-purse | Smartweed, Annual Species | Stinkweed | Thistle, Sow (Perennial) | Thistle, Canada |
| Amitrol 240 | 61 | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Casoron | 84 | | • | | • | | • | • | • | • | • | • | | | • | • | | • | | • | • | | | | | | • | • | • | • | • | | • | • | | | |
| Glyphosate | 123 | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Gramoxone | 133 | | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | | • | • | • | • | | |
| Linuron | 147 | | | • | • | | • | | • | | | • | | • | • | • | • | • | | • | • | | | | | | • | • | | • | | | | • | • | | |
| Simazine | 194 | | | • | • | | • | | • | | | • | | | • | | • | •[1] | • | • | | | | | | | | • | | | | | | • | | | |
| Trifluralin Liquids | 206 | • | | • | • | | • | | • | | | | | • | • | | • | • | • | • | • | | | | | | | • | | • | | • | | | | | |

[1] Yellow foxtail only.

# Herbicide Formulations and Companies

| *Product* | *Common Name* | *Formulation* | *Company* |
|---|---|---|---|
| 2,4-D | 2,4-D | 500, 600, 700 g/L SN, EC | Various |
| Absolute | imazamox + imazethapyr<br>+ clopyralid | 35% + 35% DG<br>+ 360 g/L | BASF Canada |
| Accent | nicosulfuron | 75% DF | E. I. duPont Canada |
| Achieve Liquid | tralkoxydim | 400 g/L SC | Syngenta |
| Achieve Liquid Gold | tralkoxydim+<br>bromoxynil + MCPA E | 400 g/L SC +<br>280 g/L+280 g/L EC | Syngenta |
| Adrenalin | imazamox<br>+2,4-D LV 700 ester | 11.40% SN<br>660 g ae/L EC | BASF Canada |
| Adrenalin SC | imazamox + 2,4-D LV 700 ester | 20 g/L + 560 g/L SC | BASF Canada |
| Advance | trifluralin | 10% G | Dow AgroSciences |
| Ally Toss-N-Go | metsulfuron methyl | 60% DF | E. I. duPont Canada |
| Amitrol 240 | amitrole | 231 g/L SN | Nufarm Agriculture |
| Approve | bromoxynil<br>+ 2,4-D LV | 280 g/L<br>+ 280 g/L | Nufarm Agriculture |
| Assert 300 SC | imazamethabenz | 300 g/L SC | Nufarm Agriculture |
| Assure II | quizalofop-p-ethyl | 96 g/L EC | E. I. duPont Canada |
| Atrazine | atrazine | 480 g/L F; 90% DG | Syngenta, UAP; Syngenta |
| Attain | fluroxypyr+ 2,4-D E | 180g/L + 564 g/L EC | Dow AgroSciences |
| Avadex BW/MicroActiv | triallate | 400 g/L EC, 10% G | Gowan Company |
| Avenge200-C | difenzoquat | 200 g/L SN | BASF Canada |
| Badge | bromoxynil+ MCPA E | 225 g/L + 225 g/L EC | UAP |
| Banvel II | dicamba | 480 g/L SN | BASF Canada |
| Basagran/Basagran Forté | bentazon | 480 g/L SN | BASF Canada |
| Bonanza | trifluralin | 400 g/L EC, 10% G | UAP |
| Buctril M | bromoxynil+ MCPA E | 280 g/L+280 g/L EC | Bayer CropScience |
| Caliber | 2,4-DB | 400, 625 g/L EC | UAP |
| Casoron | dichlobenil | 4% G | UAP |
| Centurion | clethodim | 240 g/L EC | Bayer CropScience |
| Clovitox Plus | MCPB+ MCPA | 375 g/L+ 25 g/L SN | IPCO |
| Cobutox | 2,4-DB | 600, 625 g/L EC | IPCO |
| Compitox | mecoprop | 150 g/L SN | Nufarm Agriculture |
| Credit | glyphosate | 356 g/L SN | Nufarm Agriculture |
| Curtail M | clopyralid+ MCPA E | 50 g/L + 280 g/L EC | Dow AgroSciences |
| Dichlorprop-D | dichlorprop+ 2,4-D E | 300 g/L + 282 g/L EC | IPCO |
| Dual II Magnum | metolachlor | 915 g/L EC | Syngenta |
| DyVel | dicamba+ MCPA K | 84 g/L + 336 g/L SN | BASF Canada |
| DyVel DSp | dicamba + 2,4-D A + mecoprop | 110 g/L + 295 g/L + 80 g/L SN | BASF Canada |
| Eclipse | glyphosate + clopyralid | 360 g/L SN + 360 g/L SN | Dow AgroSciences |
| Edge | ethalfluralin | 5% G | Dow AgroSciences |
| Elite | sethoxydim +<br>bromoxynil + MCPA E | 450 g/L EC<br>200 g/L + 200 g/L | Nufarm Agriculture |
| Embutox 625 | 2,4-DB | 625 g/L EC | Nufarm Agriculture |
| Eptam-8E | EPTC | 800 g/L EC | Gowan Comapny |
| Eradicane-8E | EPTC + safener | 800 g/L EC | Gowan Comapny |
| Escort | metsulfuron methyl | 60% DF | E. I. duPont Canada |
| Estaprop | dichlorprop+ 2,4-D E | 300 g/L + 282 g/L EC | Nufarm Agriculture |
| Everest | flucarbazone-sodium | 66% DG | Arysta LifeScience |
| Express Pack | tribenuron methyl+ 2,4-D E | 75% DF + 700 g/L EC | E. I. duPont Canada |
| Express TNG | tribenuron methyl | 75% DF | E. I. duPont Canada |
| Factor | glyphosate | 356 g/L SN | IPCO |
| FlaxMax | sethoxydim<br>clopyralid + MCPA E | 450 g/L EC +<br>50 g/L + 280 g/L EC | BASF Canada |
| Fortress | triallate + trifluralin | 10% + 4% G | Gowan Canada |
| Frontier | dimethanamid | 900 g/L EC | BASF Canada |
| Frontline | florasulam+ MCPA E | 50 g/L SC + 500 g/L EC | Dow AgroSciences |
| Frontline+2,4-D | florasulam + 2,4-D E | 50 g/L + 564 g/L EC | Dow AgroSciences |
| Fusion | fenoxaprop-p-ethyl + fluazifop-p-butyl | 80.5 g/L + 125 g/L EC | Bayer CropScience |
| Glyfos | glyphosate | 360 g/L SN | Cheminova |
| Gramoxone | paraquat | 200 g/L SN | Syngenta |
| Grazon | picloram+ 2,4-D E | 65 g/L + 240 g/L EC | Dow AgroSciences |
| Harmony Total | clodinafop propargyl +<br>thifensulfuron methyl +<br>tribenuron methyl | 240 g/L EC<br>50% +<br>25% DF | E. I. duPont Canada |
| Horizon | clodinafop-propargyl | 240 g/L EC | Syngenta |
| Horizon BTM | Clodinofop propargyl+<br>bromoxynil + MCPA E | 240 g/L EC +<br>225 g/L + 225 g/L EC | Sygenta |
| Kerb 50W SP | propyzamide | 50% WP | Dow AgroSciences |
| Koril 235 | bromoxynil | 235g/L EC | Nufarm Agriculture |
| Laddok | bentazon+ atrazine | 200 g/L + 200 g/L SN | BASF Canada |
| Liberty | glufosinate ammonium | 150 g/L SN | Bayer CropScience |
| Liberty 200SN | glufosinate ammonium | 200 g/L SN | Bayer CropScience |
| Linuron 400 | linuron | 400 g/L F | UAP |
| Lontrel | clopyralid | 360 g/L SN | Dow AgroSciences |
| Lorox DF | linuron | 50% DF | E. I. duPont Canada |
| Lorox L | linuron | 480 g/L F | E. I. duPont Canada |
| Maverick | glyphosate | 356 g/L SN | Dow AgroSciences |
| MCPA | MCPA | 300,400,500,564 g/L SN, EC | Various |
| Mecoprop | mecoprop | 150 g/L SN | UAP |
| Mextrol | bromoxynil+ MCPA E | 200 + 200 g/L (400 m), 225 + 225 g/L (450 m) | Nufarm Agriculture |

| *Product* | *Common Name* | *Formulation* | *Company* |
|---|---|---|---|
| Muster Gold II | ethametsulfron methyl+<br>quizalofop-P-ethyl | 75% DF +<br>96 g/L EC | E. I. duPont Canada |
| Muster Toss-N-Go | ethametsulfron methyl | 75% DF | E. I. duPont Canada |
| Odyssey | imazamox + imazethapyr | 35% + 35% DG | BASF Canada |
| Odyssey DLX | imazamox + imazethapyr +<br>tepraoxydim | 35% + 35% DF<br>200 g/L EC | BASF Canada |
| Option 35 DF | formasulfuron | 35% DG | Bayer CropScience |
| Oracle | dicamba | 480 g/L SN | Gharda/UAP/AgWest |
| Pardner | bromoxynil | 280 g/L EC | Bayer CropScience |
| Pinnacle | thifensulfuron methyl | 75% DF | E. I. duPont Canada |
| Poast Ultra | sethoxydim | 450 g/L EC | BASF Canada |
| PrePass | glyphosate + florasulam | 360 g/L SN + 50 g/L SC | Dow AgroSciences |
| Prestige | fluroxypyr+<br>clopyralid + MCPA E | 180 g/L +<br>50 g/L + 280 g/L EC | Dow AgroSciences |
| Prevail Liquid | tralkoxydim +<br>clopyralid + MCPA E | 400 g/L SC +<br>50 g/L + 280 g/L EC | Dow AgroSciences |
| Primextra II Magnum | metolachlor + atrazine | 400 g/L + 320 g/L F | Syngenta |
| Princep Nine T | simazine | 90% DG | Syngenta |
| Prism | rimsulfuron | 25% DF | E. I. duPont Canada |
| Puma$^{120}$ Super | fenoxaprop-p-ethyl | 120 g/L EC | Bayer CropScience |
| Pursuit | imazethapyr | 240 g/L SN | BASF Canada |
| Pursuit Ultra | sethoxydim + imazethapyr | 450 g/L EC + 240 g/L SN | BASF Canada |
| Refine Extra Toss-N-Go | thifensulfuron methyl+<br>tribenuron methyl | 50% +<br>25% DF | E. I. duPont Canada |
| Refine M | thifensulfuron methyl +<br>tribenuronmethyl + MCPA | 50% + 25% DF + 500g/L EC | E. I. duPont Canada |
| Reflex | fomesafen | 240 g/L SN | Syngenta |
| Reglone Desiccant | diquat | 240 g/L SN | Syngenta |
| Remedy | triclopyr | 480 g/L EC | Dow AgroSciences |
| Renegade/Renegade HC | glyphosate | 356 g/L, 540 g/L (HC) SN | Monsanto |
| Rival | trifluralin | 500 g/L EC, 10% G | Bayer CropScience |
| Roundup Original/Transorb | glyphosate | 356-360 g/L SN | Monsanto |
| Roundup WeatherMax/Ultra | glyphosate | 540 g/L SN | Monsanto |
| Rustler | glyphosate + dicamba | 194 g/L + 46 g/L SN | Monsanto |
| Select | clethodim | 240 g/L EC | Arysta LifeScience |
| Sencor | metribuzin | 75% DF, 75% DG, 500 g/L F | Bayer CropScience |
| Shotgun | atrazine + 2,4-D | 280 g/L + 120 g/L F | UAP |
| Simazine 500 | simazine | 500 g/L F | UAP |
| Solo | imazamox | 70% DG | BASF Canada |
| Spectrum | florasulam + clopyralid + MCPA E | 50 g/L SC + 50 g/L + 280 g/L EC | Dow AgroSciences |
| Sundance | sulfosulfuron | 75% DG | Monsanto |
| Sword | dicamba + mecoprop + MCPA A | 62.5 g/L + 62.5 g/L + 275 g/L SN | UAP |
| Target | dicamba + mecoprop + MCPAA | 62.5 g/L + 62.5 g/L + 275 g/L SN | Syngenta |
| Thumper | bromoxynil + 2,4-D E | 280 g/L + 280 g/L EC | Bayer CropScience |
| Topside | MCPB + MCPA A | 400g/L SN | UAP |
| Tordon 22K | picloram | 240 g/L SN | Dow AgroSciences |
| Touchdown iQ | glyphosate | 360 g/L SN | Syngenta |
| Treflan | trifluralin | 480 g/L EC, 5% G | Dow AgroSciences |
| Triton C | tribenuron methyl +<br>thifensulfuron methyl + quinclorac | 50% + 25% + 75% DS | E. I. duPont Canada |
| Trophy | fluroxypyr + MCPA E | 180 g/L + 500 g/L EC | Nufarm Agriculture |
| Tropotox Plus | MCPB + MCPA A | 400 g/L SN | Nufarm Agriculture |
| Turboprop | dichlorprop + 2,4-D E | 300 g/L + 282 g/L EC | UAP |
| Ultim | nicosulfuron + rimsulfuron | 37.5% + 37.5% WDG | E. I. duPont Canada |
| Unity | bromoxynil + triasulfuron | 280 g/L EC + 75% WG | Bayer CropScience |
| Vantage/Vantage Plus | glyphosate | 356-360 g/L SN | Dow AgroSciences |
| Velpar DF | hexazinone | 75% DF | E. I. duPont Canada |
| Venture L | fluazifop-p-butyl | 125 g/L EC | Syngenta |

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*Abbreviations*

| | |
|---|---|
| WP | wettable powder |
| DG | water dispersible granule |
| WSG | water soluble granule |
| EC | emulsifiable concentrate |
| G | granule |
| SC | suspension concentrate |
| WSP | water soluble powder |
| DF | dry flowable |
| SN | solution |
| F | flowable |
| A | amine |
| E | ester |

# Products Available as Prepackaged Tank Mixes

| Product Name (Manufacturer) | Component 1 or A | Component 2 or B | Component 3 or C | Crops | Weeds Controlled | Area Treated | Cost per acre (2005) |
|---|---|---|---|---|---|---|---|
| Absolute<br>(BASF Canada) | Odyssey | Lontrel | | CLEARFIELD canola | See component products | 40 acres or 16 ha | $33.32 |
| Achieve Liquid Gold<br>(Syngenta) | Achieve Liquid | Buctril M | Turbocharge (adjuvant) | Wheat (spring, durum, winter), barley, | See the weeds of the component products plus tame buckwheat | 20 acres or 8 ha | $23.73 |
| Eclipse<br>(Dow AgroSciences) | Lontrel (Eclipse A) | Vantage (Eclipse B) | | Roundup Ready Canola varieties | See component products | 30 acres | $14.90 |
| Elite<br>(Nufarm Agriculture) | Poast Ultra | Mextrol | Merge (adjuvant) | Flax | See component products | 20 acres or 8 ha | $21.65 |
| FlaxMax<br>(BASF Canada) | Curtail M | Poast Ultra | | Flax | See component products | 18-23 acres or 7.2-9.3 ha | $19.28 to $26.03 |
| Harmony Total<br>(E. I. duPont Canada) | Refine Extra | Horizon | Score (adjuvant) | Spring wheat (including durum) | Weeds controlled by Refine Extra plus wild oat, green foxtail | 40 acres or 16 ha | $23.80 |
| Horizon BTM<br>(Syngenta) | Buctril M | Horizon | Score (adjuvant) | Spring wheat (including durum) | Weeds controlled by Buctril M plus wild oat. | 20 acres or 8 ha | $24.35 |
| K2<br>(E. I. duPont Canada) | Refine Extra | Everest | Add 2,4-D amine and a non-ionic surfactant | Spring wheat (NOT durum) | See component products | 40 acres or 16 ha | $21.46 plus 2,4-D, surfactant |
| Muster Gold II<br>(E. I. duPont Canada) | Muster | Assure II | Sure-Mix or Merge (adjuvant) | Canola, including herbicide tolerant canola | See component products | 40 acres or 16 ha | $21.65 |
| Prevail Liquid<br>(Dow AgroSciences) | Achieve Liquid | Curtail M | Turbocharge (adjuvant) | Spring wheat (including durum), barley | Wild oat, green foxtail, persian darnel; weeds controlled by Curtail M, plus Russian thistle | 20 acres or 8 ha | $26.64 |
| Pursuit Ultra<br>(BASF Canada) | Poast Ultra | Pursuit | | Field pea, CLEARFIELD canola varieties | See Poast Ultra plus Pursuit tank mix | 40 acres or 16 ha | $26.34 |
| Refine M | Refine Extra | MCPA ester | | Spring wheat (including durum) barley, oat | See component products | 80 acres or 32 ha | N/A |

** Not recommended for use on flax by itself.*

***Note:*** *See the component products listed for information concerning staging, application information, safety precautions, the effect of weather and grazing, recropping, harvest interval and storage precautions. The more stringent recommendation of the two products should be followed. Mix products in the order listed.*

# Herbicide Directory

## 2,4-D

**Herbicide Group – 4**
*(Refer to page 27)*

### Company and Formulation:

| | PCP # | | | |
|---|---|---|---|---|
| | Amine* | | Ester** | |
| | 500 | 600 | 600 | 700 |
| IPCO | – | 17511 | – | 20310, 27819 |
| Nufarm Agriculture | 14725 | – | 14739 | 23508, 27820 |
| United Agri-Products | 9547 | 5931 | 9561 | 23563, 27818 |

* formulated as a solution.
** formulated as an emulsifiable concentrate.

### Crops, Rates and Staging:

*Application rates for individual products may vary from those listed. Refer to the label for product specific use rates.* Rates greater than those listed may cause crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

| CROP | MAXIMUM SAFE RATE (L/ACRE) | STAGE |
|---|---|---|
| Wheat, barley, spring rye | 0.45 (500 g/L)<br>0.38 (600 g/L)<br>0.32 (700 g/L) | 4 leaf to early flag leaf |
| Fall rye,-winter wheat* | 0.45 (500 g/L)<br>0.38 (600 g/L)<br>0.32 (700 g/L) | In spring, apply after winter cereals begin grow but before emergence of the flag leaf. |
| Corn* | 0.42 (500 g/L)<br>0.35 (600 g/L) | Apply as an overall spray before corn is 6 inches (15 cm) tall and before the 6-leaf stage. After 6 inches (15 cm) use a directed spray. |
| Seedling and established grasses for forage and seed production* | 0.45 (500 g/L)<br>0.38 (600 g/L)<br>0.32 (700 g/L) | Apply from the 3 leaf stage to emergence of the flag leaf of seedling grasses. For established grasses for seed production, apply in spring up to emergence of the flag leaf. |
| Established forage grass *(not for seed production)** | 0.93 (500 g/L)<br>0.78 (600 g/L)<br>0.67 (700 g/L) | Apply in spring up to emergence of the flag leaf of established grasses, or in the fall after harvest. |
| Established grass pastures | 1.81 (500 g/L)<br>1.51 (600 g/L)<br>1.30 (700 g/L) | No restrictions, apply when weeds are actively growing.<br>For control of brush species, apply at time of rapid growth (usually May to mid-June, and September prior to colour change). |
| Turf* | 0.91 (500 g/L)<br>0.76 (600 g/L) | Apply in spring and early September on established turf.<br>Do not use on bent grasses. |
| Fall stubble* –<br>Canada thistle suppression | 0.91 (500 g/L)<br>0.76 (600 g/L)<br>0.65 (700 g/L) | Canada thistle (suppression only) - Apply when thistle plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth. Regrowth will be present the following spring and in-crop treatments will be required. |

* Note: Registered for use only with certain brands of 2,4-D; use of non-registered products is at the risk of the user.

## Weeds, Rates and Staging:

Apply at lower rates when weeds are small (2 to 4 leaf stage) and actively growing. Higher rates are needed when weeds are larger, in heavy populations, or growing under stressful conditions (excessively cold, hot, dry or wet). Lower rates may be applied in late fall to control winter annual weeds.

*Note: The rates listed differ slightly from product to product. Check individual product labels for exact use rates.*

**Susceptible Weeds:**
0.27 to 0.45 L/acre (500 g/L)
0.22 to 0.38 L/acre (600 g/L)
0.19 to 0.32 L/acre (700 g/L)

Bluebur
Burdock
Cocklebur
False Flax
Flixweed (late fall application or spring seedlings)
Goat's-beard
Kochia
Lamb's-quarters
Mustards (except dog and tansy mustard)
Narrow-leaved hawk's-beard (fall application to seedlings or spring application at 1-2 leaf stage)
Plantain
Prickly lettuce
Ragweed (common, false and giant)
Russian pigweed
Russian thistle
Shepherd's-purse**
Stinging nettle
Stinkweed**
Sweet clover
Thyme-leaved spurge
Volunteer canola (including all herbicide tolerant varieties)
Wild Radish
Wild Sunflower

**Harder to kill weeds:**
0.48 to 0.74 L/acre (500 g/L)
0.40 to 0.61 L/acre (600 g/L)
0.34 to 0.53 L/acre (700 g/L)

Annual sowthistle
Blue lettuce*
Burdock (top growth only of bolting plants)
Canada thistle***
Common chickweed
Common groundsel**
Common peppergrass
Dandelion*
Flixweed (spring prior to bolting)
Knotweed
Lady's-thumb
Leafy spurge*
Mustard (Dog & Tansy)
Narrow-leaved Hawk's-beard (spring prior to bolting)
Oak-leaved goosefoot
Pineappleweed
Prostrate pigweed
Purslane
Redroot pigweed
Russian thistle
Sheep sorrel
Tumble pigweed

**Top Growth Control only (at rates for harder to kill weeds):**

Biennial wormwood
Bull thistle
Buttercup
Curled dock
Field bindweed
Gumweed
Hedge bindweed
Hoary cress
Horsetail
Mouse-eared chickweed
Perennial sow-thistle
Russian knapweed
Tartary buckwheat
Volunteer Sunflower

* Control of seedlings at rates given above and top growth control only of established plants.

** Spring seedlings. Winter annual weeds - apply in late fall or early spring prior to bolting.

*** Suppression only - Apply when Canada thistle plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth. Regrowth will be present the following spring and in-crop treatments will be required.

## Cost (2005 suggested retail prices):

**Amine 500 g/L** - $6.60 to $6.17 per L
**Amine 600 g/L** - $7.41to $7.93 per L
**LV Ester 600 g/L** - $8.05 to $9.08 per L
**LV Ester 700 g/L** - $9.95 to $10.79 per L

## Formulation Characteristics:

| Formulation | Risk of-Vapour Drift | Activity on Weeds | Risk of-Crop Injury |
|---|---|---|---|
| LV Ester | Medium | Fast | Medium |
| Amine | Very Low | Medium | Low |

## Application Information:

**Water Volume:** Minimum 20 L per acre - ground application. Water rates depend on product and use. Consult label for details.

Higher application volumes (40 L/acre or greater), reduce the risk of crop injury.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Best weed control occurs when temperatures are above 21°C (daytime) or 10°C (nighttime) and humidity is above 70 percent. Do not apply if temperature exceeds 27°C.

## Tank Mixes:

**Mixes listed may not occur on all products labels. Check individual product labels for registered mixes.**

**Note: Following list is for mixes listed on 2,4-D labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

**Herbicides:**

***Spring wheat (including durum), winter wheat and barley:***
Avenge (2,4-D ester only)
Refine Extra* (2,4-D ester only)

***Spring wheat (including durum), and barley:***
Assert (2,4-D ester only)
Express DF (2,4-D ester only)

***Wheat and barley:***
Banvel (2,4-D amine only)
Ally* (2,4-D ester only)

* The addition of a non-ionic surfactant is required.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** 2,4-D amine - within 4 hours will reduce control. 2,4-D LV ester - within 2 hours will reduce control.

**Grazing:** Do not permit lactating dairy animals to graze fields within 7 days of application. Do not harvest forage or cut for hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

**Recropping:** No restrictions the year after treatment.

**Aerial Application:** Some formulations may be applied by air. Check the label for detailed instructions.

**Storage:** 2,4-D LV ester may be frozen. 2,4-D amine requires heated storage.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◈ Warning Poison

☠ Danger Poison - Ester 700 Formulations

# 2,4-DB

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

IPCO (Cobutox 600 – PCP#22404, Cobutox 625 – PCP#27911)
Nufarm Agriculture (Embutox 625 – PCP#19217, 27912)
United Agri Products (Caliber 400 – PCP#16736, Caliber 625 – PCP#27910)

## Formulations:

**Cobutox 600:** 600 g/L 2,4-DB formulated as an emulsifiable concentrate. Container size - 10 L.

**Caliber, Cobutox and Embutox 625:** 625 g/L 2,4-DB formulated as an emulsifiable concentrate. Container size - 10 L.

**Caliber 400:** 400 g/L 2,4-DB formulated as an emulsifiable concentrate. Container size - 10 L.

## Crops and Staging:

NOTE - When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

| CROP | STAGE |
|---|---|
| Seedling alfalfa, bird's-foot trefoil* | 1 to 4 trifoliate leaf stage |
| Clover (alsike, red, white, Dutch but NOT sweet clover)* | As soon as possible after emergence of the 1st trifoliate leaf |
| Wheat, barley or oats** | 5 leaf to emergence of the flag leaf |
| Field corn | 15 inches (38 cm) to prior to tassling using drop nozzles. |
| Pastures containing forage legumes | After cutting or grazing and regrowth less than 3 inches (7.5 cm) |

* With or without a cereal cover crop.

** Caliber 400 not registered for use on oats.

**Seedling Forage Grasses*:**

Apply from 2 to 4 leaf stage of:

Bromegrass (smooth)
Fescue (creeping red, meadow, tall)
Orchard grass
Timothy
Wheatgrass (crested, intermediate, streambank, tall)

* Not for seed production. Not for feeding in the establishment year.

## Weeds and Staging:

**Weeds controlled from the 2 to 4 leaf stage at lower recommended rates include:**

Ball mustard
Lamb's-quarters
Ragweed
Redroot pigweed
Shepherd's-purse
Stinkweed
Wild mustard
Wormseed mustard

**Weeds controlled at higher recommended rates include:**

| WEED | STAGE |
|---|---|
| Bull thistle | Rosette |
| Canada thistle* | 6 in. (15 cm) to early bud |
| Chicory | Rosette |
| Curled dock** | Young and actively growing |
| Dandelion* | Prior to bud |
| Field bindweed* | Late summer |
| Green smartweed** | Seedlings |
| Horsetail* | 4 to 5 inches (10 to 13 cm) |
| Narrow-leaved hawk's- beard | Apply at rosette stage after alfalfa has gone dormant |
| Oak-leaved goosefoot | Up to 2 leaf stage |
| Perennial sow-thistle* | Rosette |
| Lady's-thumb** | Seedlings |
| Plantain | Prior to flowering |
| Wild buckwheat | Up to 2 leaf stage |
| Yellow rocket | Late September to mid-October |

* Top growth control
** Suppression
Refer to individual product labels for details on application rates to use for different weed species.

## Cost (2005 suggested retail prices):

Cobutox 600 - $21.70 per L
Cobutox 625 - N/A
Embutox 625- $21.30 per L
Caliber 400 - $14.38 per L
Caliber 625 - N/A

## Rates:

When applying to seedling forage legumes and grasses:

| HERBICIDE | RATE (L/ACRE) | ACRES TREATED PER CONTAINER |
|---|---|---|
| Cobutox 600 | 0.73 - 0.93 | 13.7 - 10.8 |
| 625 g ai/L formulations of 2,4-DB | 0.71 - 0.91 | 14.1 - 11.0 |
| Caliber 400 | 1.1 - 1.4 | 9.0 - 7.0 |

When applying to corn and to pastures containing forage legumes:

| HERBICIDE | RATE (L/ACRE) | ACRES TREATED PER CONTAINER |
|---|---|---|
| Cobutox 600 | 0.73 - 1.13 | 13.7 - 8.8 |
| 625 g ai/L formulations of 2,4-DB | 0.71 - 1.11 | 14.1 - 9.0 |
| Caliber 400 | 1.11 - 1.72 | 9.0 - 5.8 |

## Application Information:

**Water Volume:** 61 to 81 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Severe damage to legumes can occur if high temperatures (more than 27°C) or high humidity prevail at the time of application. Do not apply under dry soil/drought conditions.

## Tank Mixes:

**Herbicides:**
***Underseeded Legumes:*** All 625 g ai/L formulations of 2,4-DB (0.51 L/acre), Cobutox 600 ( 0.53 L/acre), or Caliber 400 (0.81 L/acre), plus MCPA amine (500 g/L) at 28 mL/acre. Embutox 625 (0.51 L/acre) plus MCPA sodium salt (300 g/L) at 47 mL/acre. This tank mix may increase crop damage (stunting). Follow all precautions and restrictions on both product labels.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on 2,4-DB labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 1 hour will reduce control.

**Grazing:**
Cobutox 600 - Do not graze or harvest treated seedling grasses in year of application.
Embutox 625, Cobutox 625 and Caliber 625 - Do not graze or cut treated crops or forage until 30 days after application.

Caliber 400 - Do not graze treated crops or cut for hay.

**Recropping:** No restrictions the year after application.

**Aerial Application:** Do not apply by air (Cobutox 625, Embutox 625 and Caliber 625). No restriction on other labels. Reduced water volumes used with aerial applications will lead to increased injury to forage legumes.

**Storage:** Do not freeze Caliber 400.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◉ Danger Poison (Cobutox 600)

▼ Caution Poison (625 g ai/L 2,4-DB formulations)

◈ Warning Poison (Caliber 400)

# Absolute

## Herbicide Group – 2,4

*(Refer to page 27)*

**This product is a prepackaged tank mix of Odyssey at 17g/acre (page 160) and Lontrel† at 0.17 L/acre OR Lontrel Dry (Lontrel Dry is only available with Absolute) at 80 g/acre (page 150). Information listed is restricted to Crop, Weeds, Rates and Cost. For other detailed information on the effect of growing conditions, and restrictions for the component products see the product pages listed above.**

## Company:

BASF Canada

## Formulation:

**Odyssey (PCP#25111):** 35% imazamox and 35% imazethapyr formulated as a dispersible granule.
Absolute may be prepackaged with either:

**Lontrel (PCP#23545)†:** 360 g/L clopyralid formulated as a solution.
Container size – 8 x 86.5 g. water-soluble bags of Odyssey plus 2 x 3.4L jug of Lontrel (one case treats 40 acres).

OR

**Lontrel Dry (PCP#27306):** 75% clopyralid formulated as a dispersible granule.
Container size – 4 x 173 g Odyssey plus 800 g Lontrel Dry, (one case treats 40 acres).

† The liquid combination of Absolute is no longer produced, but supplies still remain in the retail system. This product may be removed from future editions of this guide.

## Crops and Staging:

CLEARFIELD canola varieties from the 2 to 6 leaf stage. Apply **only** to CLEARFIELD canola varieties; application to any other variety of canola or any other crop will result in crop death.

## Weeds and Staging:

**Grasses:**

Apply from 1 to 4 main stem leaves, until tillers are visible.

Barnyard grass
Green foxtail
Persian darnel
Volunteer cereals (wheat, barley, oats)
Wild oats

**Broadleaves:**

Unless otherwise indicated, apply to broadleaf weeds up to 4-leaf stage.

Canada thistle (rosette to pre-bud stage)*
Chickweed
Cleavers (up to 4 whorls)
Flixweed
Hemp-nettle
Kochia**
Lamb's-quarters**
Perennial Sow-thistle*
Redroot pigweed
Russian thistle
Shepherd's-purse
Smartweed
Stinkweed
Stork's-bill
Volunteer canola (non-CLEARFIELD varieties)
Volunteer tame mustard
Wild buckwheat
Wild Mustard

* top growth control for 6-8 weeks
** suppression

## Cost (2005 suggested retail price):

$33.32 per acre

## Rate:

**Odyssey:** 17.3 g/acre
**Lontrel:** 0.17 L/acre or
**Lontrel Dry:** 80 g/acre.
**Merge:** 0.5 L per 100 L of spray solution

Absolute must be applied with Merge adjuvant (not supplied). Mix to a final ratio of 0.5 L of Merge in 100 L of spray solution (0.5% Merge volume to Spray solution volume). At a spray volume of 40 L/acre one 8.1 L jug of Merge will treat 40 acres.

One case treats 40 acres.

Do not apply more than once per year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan nozzles calibrated for 20-40 psi. Use a 50 mesh or coarser screen and filter system.

See component products for additional information including restrictions.

# Accent*

## Herbicide Group – 2

*(Refer to page 27)*

## Company:

E. I. duPont Canada (PCP#25116)

## Formulation:

75% nicosulfuron formulated as a water dispersible granule.

Container size - 133.6 g (4 x 33.4 g water soluble bags).

## Crops and Staging:*

**Field Corn** - 1 to 8 leaf stage (six visible collars), coleoptile (short, blunt leaf) is counted as the first leaf.

**Sweet corn (Krispy King, Jubilee and Jubilee Supersweet varieties only)** – 1 to 6 leaf stage (4 visible collars).

** NOTE - Since applications to field and sweet corn in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. **Application to corn is at the risk of the user.***

## Weeds and Staging:

| WEEDS | STAGING |
|---|---|
| Barnyard grass,<br>fall panicum,<br>green foxtail,<br>yellow foxtail*,<br>old witchgrass | 1-6 leaves (up to 2 tillers) |
| Quackgrass | 3-6 leaves (with extended leaf 4-8 inches (10 to 20 cm) long) |
| Wild oats | 3-6 leaves |

* suppression only

The most benefit is gained by applying at the earlier end of the leaf stage ranges.

## Cost (2005 suggested retail price):

$24.32 per acre.

## Rates:

Apply Accent at 13.5 g/acre. Add non-ionic surfactant (Citowett Plus, Agsurf or Agral 90) at 0.2 L per 100 L of spray solution.

One bag of Accent will treat 2.5 acres (1 ha).

One container will treat 10 acres (4 ha).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** Minimum 40 L per acre; optimum 56 to 77 L per acre.

**Pressure:** 25 to 40 psi (175 to 275 kPa).

**Nozzles:** Flat fan nozzles tilted forward at a 45° angle. Screens of 50 mesh or larger are recommended.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Poor weed control or crop injury may result if at the time of application, plants are under stress from disease, insect or nematode injury, carryover of herbicide from a previous years application, abnormally hot or cold weather, drought, water-soaked soils, hail damage or frost. Delay application until stress passes and both corn and weeds have resumed growth. When corn is injured by frost, wait 48 to 72 hours after normal growing conditions have resumed before applying Accent. Stress conditions after application may also result in injury or poor weed control.

## Tank Mixes:

**Herbicides:**

***Field corn only:***

Banvel II (0.24 L/acre) plus surfactant.
Pardner (0.4 L/acre) plus surfactant.

**Fertilizers:** Do not mix with fertilizers.

**Insecticides:** None registered. Accent should not be applied to corn that has been treated with Counter, Cygard, Thimet, or Di-Syston. Leave seven days between the application of Accent and that of a foliar organophosphorous insecticide.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Accent label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

## Restrictions:

**Rainfall:** Within 2 to 4 hours of application may result in reduced weed control.

**Grazing:** Do not graze treated crops or cut for hay.

**Preharvest:** Leave at least 30 days in field corn and 40 days in sweet corn from application to harvest.

**Recropping:** Corn and spring cereals may be seeded the year following Accent application. For all other crops, a field bioassay is recommended before planting.

**Aerial Application:** Do not apply by air.

**Storage:** Store product in original containers in a secure, dry area, away from other pesticides, food or feed.

**Environment:** Leave a 5 m buffer between the last spray path and woodlots or shelterbelts. Leave a 22 m buffer before wetland areas or water bodies.

## Tank Cleaning:

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill spray tank with a water-ammonia cleaning solution (1 litre of a minimum 3% household ammonia for every 100 L of water). Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes, then flush hoses, boom and nozzles with the cleaning solution, and drain the tank. Remove and clean the nozzles and screens separately in a bucket containing the cleaning solution as above. If the spray equipment is to be used to spray crops other than corn, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water. Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

For additional information, refer to page 14.

## Hazard Rating:

KEEP OUT OF REACH OF CHILDREN.
Caution Eye Irritant

Avoid breathing spray mist.
Avoid contact with skin, eyes and clothing.

# Achieve Liquid

**Herbicide Group – 1**
*(Refer to page 27)*

## Company:

Syngenta (PCP#27011)

## Formulation:

**Achieve Liquid:** 400 g/L tralkoxydim formulated as a suspension concentrate.
Container size – 8 L plus 8 L of Turbocharge adjuvant.

## Crops and Staging:

No staging restrictions.

Spring wheat (including durum), winter wheat, barley, triticale, rye (spring and fall).

May be used on wheat and barley crops undersown to forage legumes (if not tank mixed with a broadleaf herbicide):

Alfalfa
Bird's-foot trefoil
Clovers
Sanfoin

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Seedling and established forages* applied prior to tillering of weeds including: creeping red fescue, crested wheatgrass, intermediate wheatgrass, meadow bromegrass and smooth bromegrass either underseeded to a cereal or grown alone.

For the establishment of forages grasses* applied prior to tillering of weeds including: northern wheatgrass, slender wheat grass and western wheatgrass.

** NOTE - Since applications to forage grasses has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Applications to forage grasses is at the risk of the user***

## Weeds and Staging:

***Wild oats*** - 1 to 6 leaf stage (total leaves including tillers), with a maximum of 2 tillers.

***Volunteer tame oats*** - 1 to 6 leaf stage.

***Green and yellow foxtail*** - 1 to 5 leaf stage (total leaves including tillers), with a maximum of 1 tiller.

***Barnyard grass, Persian darnel*** - 1 to 4 leaf stage (total leaves including tillers).

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

## Cost (2005 suggested retail price):

$16.63 per acre.

## Rates:

0.2 L per acre. One case treats 40 acres. Add Turbocharge at a rate of 0.5 L per 100 L spray solution.

If water analysis shows application water bicarbonate levels are 400 ppm or greater, add ammonium sulfate at 0.75 to 1.5 kg per 100 L of spray water prior to mixing.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:**
*Ground:* 20 to 40 L per acre. Application in less than 20 L per acre water volume may result in mixing problems or unacceptable crop injury.
*Aerial:* 12 to 18 L/acre.

**Pressure:**
*Ground:* 40 psi (275 kPa).
*Aerial:* 20 to 40 psi (140 to 275 kPa)

**Nozzles:** 80° or 110° flat fan nozzles. All strainer and nozzle screens must be 50 mesh or coarser.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Cereal crops that have set tillers may incur injury (yellowing and/or stunting) if applications are made within 48 hours of freezing temperatures. Cereal crops that have not set tillers may be injured if exposed to temperatures of 4°C or less up to 48 hours before or after application. Tank mixing with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from application. Temporary crop injury may occur when Achieve tank mixes (particularly Estaprop, Turboprop, Dichlorprop D, and Buctril M + MCPA) are applied under extreme environmental conditions (dry or wet, cool or hot weather) resulting in crop stress. Control of grasses could be reduced when they are stressed due to drought, heat, lack of fertility, flooding or prolonged cool temperatures.

## Tank Mixes:

For all tank mixes with Achieve, add Turbocharge at a rate of 0.5 L per 100 L of spray solution.

**Herbicides:**

Do NOT tank mix Achieve products with a broadleaf herbicide when applying to underseeded forage grasses or legumes.

| Tank mix Partner | CROPS | | | | | | |
|---|---|---|---|---|---|---|---|
| | Spring wheat | Durum | Winter wheat | Barley | Spring Rye | Fall Rye | Triticale |
| 2,4-D ester (0.38 L/acre)◊ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Attain (40 acres per case)** | ✓ | | | ✓ | | | |
| Buctril M (0.4 L/acre)* | ✓ | ✓ | ✓ | ✓ | | ✓ | |
| Curtail M (0.81 L/acre) | ✓ | ✓ | | ✓ | | | |
| Dichlorprop + 2,4-D (0.71 L/acre)* | ✓ | ✓ | ✓ | ✓ | | | |
| Lontrel (0.11 L/acre) + MCPA ester (0.45 L/acre) | ✓ | ✓ | | ✓ | | | |
| MCPA ester (0.45 L/acre) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Mextrol 450M (0.51 L/acre)* | ✓ | ✓ | | ✓ | | | |
| Pardner (0.40 L/acre)* | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Prestige (20 acres per case)** | ✓ | ✓ | | ✓ | | | |
| Thumper (0.40 L/acre)* | ✓ | ✓ | | ✓ | | | |
| Trophy (20 acres/case) | ✓ | ✓ | | ✓ | | | |

◊ 600 g/L formulations

* Tank mixes may result in some temporary initial injury under adverse environmental conditions.

** Temporary crop injury can occur if applied prior to the 4 leaf stage. A reduction in wild oat control may occur with this mix.

Do NOT tank mix Achieve with herbicides or formulations of herbicides not listed above as loss of grass control may result. When applying broadleaf herbicides not listed above, in the same field, always apply Achieve first. Apply the broadleaf product no sooner than seven days after application of Achieve.

**Fertilizers:** None registered.

**Insecticides:** Decis Flowable at 49 mL per acre. This mix may also be mixed with Buctril M or Pardner,.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Achieve label only. To check for other possible mixes see the blue chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 1 hour will reduce control.

**Grazing:** Straw from treated crops may be fed to livestock. Immature cereal crops may be grazed or cut for hay 16 days after treatment. Do not feed or graze underseeded forage crops in year of treatment

**Preharvest:** Leave at least 60 days from application to harvest.

**Recropping:** Do NOT replant treated areas to tame oats or corn for at least 4 weeks after application.

**Aerial Application:** Achieve may be applied by air in 14 to 18 L/acre. Do not apply within 50 m of fish bearing waters and wildlife habitat.

**Storage:** Store in a dry place. Do not freeze.

**Environment:** Do not apply within 15 m by ground (50 m by air) of fish bearing waters, wetlands and wildlife habitat.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Skin and Eye Irritant

# Achieve Liquid Gold

**Herbicide Group – 1,4,6**
*(Refer to page 27)*

**This product is a prepackaged tank mix of Achieve (page 54) and Buctril M (page 81). Information listed is restricted to Crop, Weeds, Rates and Cost. For other detailed information on the component products see the product pages listed above.**

## Company:

Syngenta

## Formulation:

Achieve Liquid Gold contains 3 components:

**Achieve Liquid (PCP#27011):** 400 g/L tralkoxydim formulated as a suspension concentrate. Container size – 4 L

**Buctril M (PCP#18022):** 280 g/L bromoxynil and 280 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 8 L.

**Turbocharge adjuvant (PCP#23135).** Container size - 4 L.

## Crops and Staging:

Spring wheat (including durum), barley - 2 leaf to early flag leaf stage.

Winter wheat, fall rye - from the time growth commences in the spring to the early flag leaf stage.

## Weeds and Staging:

**Grassy weeds :**

Wild oats - 1 to 6 total leaves to a maximum of 2 tillers

Barnyard grass, Persian darnel - 1 to 4 total leaves including tillers

Green & yellow foxtail
- 1 to 5 total leaves, maximum of 1 tiller

Volunteer tame oats - 1 to 6 leaf stage.

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are controlled before tillering.

**Broadleaf weeds:**

***Up to the 4 leaf stage:***

American nightshade
Ball mustard
Bluebur
Cocklebur
Cow cockle
Flixweed
Green smartweed
Kochia*
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed
Russian thistle*
Scentless chamomile
(spring annuals only)
Shepherd's-purse
Velvetleaf**
Volunteer canola
Volunteer sunflower

***Up to the 6 leaf stage:***

Wild tomato

***Up to the 8 leaf stage:***

Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tartary buckwheat
Volunteer tame buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

***Perennials (top growth control):***

Canada thistle
Perennial sow-thistle

* Spray before plants are 2 inches (5 cm) in height.
** Spray before plants are 3 inches (8 cm) in height.

## Cost (2005 suggested retail price):

$23.73 per acre.

## Rates:

One case treats 20 acres. Add Turbocharge at a rate of 0.5 L per 100 L spray solution.

If water analysis shows bicarbonate levels are 400 ppm or greater, add ammonium sulfate at 0.75 to 1.5 kg per 100 L water.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 20 to 40 L per acre. Do not apply with air assist sprayers set to apply less than 20 L per acre water volume as mixing problems or unacceptable crop injury could occur.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** 80° or 110° degree flat fan nozzles. All strainer and nozzles screens must be 50 mesh or coarser.

## Tank Mixes:

**Herbicides:** MCPA ester (0.22 L/acre) (500 g/L formulations). A reduction in green foxtail control may occur with this tank mix.

**Insecticides:** Decis Flowable (49 mL/acre).

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

# Adrenalin*/Adrenalin SC

**Herbicide Group – 2,4**
*(Refer to page 27)*

## Company:

BASF Canada

## Formulations:

**Adrenalin* contains two separate components:**
**AC 299,263 (PCP#26705):** 120 g/L imazamox present as an ammonium salt and formulated as a solution.
**2,4-D LV700 (PCP#23508):** 660 g ae/L 2,4-D LV ester formulated as an emulsifiable concentrate.
Container size – Each case includes 2 jugs that are split internally. Each jug contains 1.34 L of AC 299,263 and 6.8 L of 2,4-D LV700 Ester.

**Adrenalin SC (PCP#27879):** 20 g/L imazamox and 560 g/L 2,4-D ester formulated as a suspension concentrate.
Container size 2 X 8L.

*Adrenalin as a co-package of AC 299,263 and 2,4-D LV700 Ester is no longer produced but some stocks remain in the retail system. Adrenalin co-pack may be removed from future editions of this publication.

## Crops and Staging:

Adrenalin: CLEARFIELD wheat varieties - 4 to 6 leaf stage.

Adrenalin SC: CLEARFIELD wheat varieties – fully expanded 3 leaf to 6 leaf stage.

Apply only to CLEARFIELD wheat varieties; application to any other variety of wheat or any other crop will result in crop death.

*NOTE: The 2,4-D ester in the Adrenalin co-pack product carries a warning that the rate used in this mix is greater than the recommended safe rate for 2,4-D on wheat and injury to the crop is possible. Adrenalin SC uses the same rate of 2,4-D but carries no warning.*

## Weeds and Staging:

**Grasses:**
Apply from 1 to 4 main stem leaves, to a maximum of two tillers.

Barnyard grass†
Green foxtail
Yellow Foxtail†

Volunteer cereals (non-Clearfield wheat, barley,)
Volunteer oats**
Wild oats

† Adrenalin SC formulation only
** Adrenalin formulation only.

**Broadleaves:**
***The following weeds will be controlled up to the 4-leaf stage under a wide variety of conditions. Application at an earlier weed stage provides the best yield response.***

Annual Smartweed species (including Lady's Thumb)†
Annual sow-thistle
Bluebur
Cleavers*
Cocklebur
Cow cockle†
Daisy fleabane
False flax
Flixweed
Goat's-beard
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Narrow-leaved hawk's-beard†
Plantain

Prickly lettuce
Ragweeds
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's purse
Stinging nettle
Stinkweed
Sweet clover
Thyme-leaved spurge†
Volunteer canola (all varieties)
Wild buckwheat††
Wild mustard
Wild radish
Wild sunflower

* suppression
† Adrenalin SC formulation only
†† suppression with Adrenalin only, full control with Adrenalin SC

***The following weeds are controlled to the two leaf stage with Adrenalin or suppression up to the four leaf stage with Adrenalin SC when conditions are optimal for growth. Control may be reduced if weeds are found in high population densities, or are growing under stressful conditions (drought, cold, heat).***

Biennial wormwood◇
Blue lettuce◇
Chickweed, Common
Cleavers††
Curled dock◇
Dandelion◇
Groundsel, Common
Gumweed◇
Heal-all†
Hedge bindweed◇
Hemp-nettle†
Horsetail†
Knotweed
Leafy spurge◇

Mustards (dog and tansy)
Oak-leaved goosefoot†
Peppergrass, Common
Pineappleweed
Pigweed, Prostrate
Pigweed, Tumble†
Purslane
Russian knapweed◇
Sheep sorrel◇
Smartweed (including lady's-thumb)**
Wild buckwheat**
Yellow rocket

◇ Only seedlings of biennial and perennial weeds will be controlled. Established plants emerging from roots will not be controlled.
** Adrenalin only, listed as full control on the Adrenalin SC label.
† Adrenalin SC formulation only
†† Controlled to the 2 leaf stage with Adrenalin SC only.

***The 2,4-D component of Adrenalin and Adrenalin SC will give top growth control of the following weeds . Control may be reduced if weeds are found in high population densities, or are growing under stressful conditions (drought, cold, heat).***

Bull thistle
Burdock
Buttercup
Canada thistle
Curled dock
Field bindweed
Hoary cress
Mouse-eared chickweed**
Perennial sow-thistle
Tartary buckwheat

** Adrenalin formulation only

## Cost (2005 suggested retail price):

$22.49 per acre.

## Rate:

**Aderenalin:**
*AC 299,263:* 67 mL/acre
*2,4-D LV700:* 0.34 L/acre as labelled.
(One case treats 40 acres).

**Adenalin SC:** 0.4 L per acre (One case treats 40 acres).
*Agral 90 Ag-Surf* or *Surf 92* at 0.25 L per 100L of spray solution.

Use of an anti-foam agent is suggested.

Do not apply more than once per year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** No nozzle preference is indicated. Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Initial crop injury may be observed after application but this is outgrown and should not affect yield. Severe crop injury will occur as a result of spray overlap. AVOID SPRAYER OVERLAP.

Do not spray if freezing or near freezing (+2 Celsius or lower) temperatures are forecast. Treat CLEARFIELD wheat during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced. Application must be made before the crop canopy shields the weeds.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** DO NOT graze the treated crop within 14 days of application or cut for hay within 42 days of application.

**Preharvest Interval:** Do not apply within 79 days of harvest.

**Recropping:** The following crops may be grown safely the year following an application:
Field peas, canola (all varieties), flax, spring wheat, durum, barley, oats.
Conduct a field bioassay the year before growing any other crop than those listed above.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze. Store in a cool, dry place above 5°C.

**Environment:**
***Adrenalin/Adrenalin SC*** - These products are highly toxic to non-target plants. Avoid overspraying and applying in situations when drift may occur. Leave a buffer zone of 11 metres between the downwind edge of the spray boom and sensitive areas. Areas to be buffered include shelter belts, hedgerows, wetlands, woodlots, vegetated ditchbanks, ponds, streams, potholes, sloughs, and other cover on the edges of fields.
***Adrenalin SC*** – This product contains petroleum distillate which is toxic to aquatic organisms. Avoid contamination of aquatic systems during application and cleaning operations.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Keep Out of Reach of Children (AC 299,263), Adrenalin SC

◈ Warning Poison (2,4-D LV700)

# Ally Toss-N-Go

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

E. I. duPont Canada Inc. (PCP#24388)

## Formulation:

60% metsulfuron methyl formulated as a dry flowable. Container size - 122 g package (4 x 30.5 g water soluble bags).

## Crops, Rates and Staging:

**Cereals – up to 3 g/acre:**
Wheat (spring and durum), barley - 2 leaf to emergence of the flag leaf.

**Forage grasses (seedling or established)* - up to 3 g/acre:**
Apply from the 2 leaf to flag leaf stage and before canopy is dense enough to prevent thorough leaf coverage.

***For forage or seed production*:***

Crested wheatgrass
Intermediate wheatgrass
Orchard grass

***For seed production only:***
Creeping red fescue*

**Pasture and Rangeland** – Up to 12 g/acre

** NOTE - Since applications to forage grasses have been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. **Application to forage grasses is at the risk of the user.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

**Cereals and forage grasses:**

Unless otherwise indicated, apply to weeds at the 2 to 4 leaf stage.

Alone or in tank mix with a grass control herbicide use 3 g/acre. Use 2 to 3 g/acre (One 122 g package treats 40 to 60 acres) of Ally when tank mixing with 2,4-D or MCPA. Add non-ionic surfactant such as Agral 90, Agsurf, Companion, Super Spreader or Citowett Plus at 0.2 L per 100 L spray volume.

***Weeds Controlled:***

Ball mustard
Bluebur
Chickweed
Common groundsel
Lady's-thumb
Prostrate pigweed
Redroot pigweed
Scentless chamomile
Corn spurry
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia
Shepherd's-purse
Stinkweed
Stork's-bill
Tartary buckwheat
Volunteer canola*
Wild mustard

* CLEARFIELD varieties will be controlled only with the addition of 2,4-D or MCPA.

***Weeds Suppressed:***

Canada thistle**
Lamb's-quarters
Russian thistle
Wild buckwheat***
Sow-thistle (annual and perennial)
Toadflax

** Apply when thistles are less than 6 inches (15 cm) tall.
*** Apply to wild buckwheat up to the 3 leaf stage,

**Pastures and Rangelands:**
Western snowberry - 10 g/acre
Wild rose - 12 g/acre

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

$4.02 to $6.03 per acre.

## Application Information:

**Water Volume:**
***Cereals and forage grasses:*** Minimum 40 L per acre.
***Pastures and Rangelands:*** 40 to 91 L per acre.

**Pressure:** No application pressures are recommended by the manufacturer. Typical application pressures for standard flat fan nozzles are from 35 to 40 psi (240 to 275 kPa).

**Nozzles:** Flat fan nozzles. Use 50-mesh screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Ally may injure crops stressed by heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures, drought, or water-saturated soils, either before or after application. Weed control will be reduced under dry, cold conditions.

## Tank Mixes:

Do not mix the soluble bags with any substance containing boron or which releases chlorine.

**Herbicides:**

*In wheat and barley:*
2,4-D Amine or Ester (0.34 to 0.45 L/acre of 500 g/L formulation), plus surfactant.
Avenge (1.72 L/acre), no surfactant required.
Avenge + MCPA Ester, no surfactant required.
MCPA Amine or Ester (0.28 to 0.45 L/acre of 500 g/L formulation), plus surfactant.

*In spring wheat (including durum):*
Horizon (95 or 115 mL/acre) plus Score adjuvant
Puma[120] Super (0.15 to 0.31 L/acre), no surfactant required.

*In creeping red fescue:*
Assure II (0.2 to 0.3 L/acre) plus Sure-Mix adjuvant.

Consult tank mix partner labels for additional crop staging and variety restrictions.

**Fertilizer:** None registered. Do not mix the soluble bags with fertilizers.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Ally label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Rain within 4 hours of application of tank mixes with 2,4-D amine, 2 hours of application of tank mixes with 2,4-D ester, will reduce weed control.

**Grazing:** No restrictions.

**Recropping:** Refer to table on the following page. The following recropping intervals, based on soil pH, should be considered as guidelines only. Ally residues may affect crops for a longer period of time than outlined in the following table. Add 12 months to recommendations if less than 5 inches (130 mm) of rainfall in brown and dark brown soils or less than 10 inches (250 mm) rainfall in black or grey wooded soils in any year following application.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool, dry place. May be frozen.

## Caution:

Ally residues can persist for long periods, potentially limiting recropping options. Degradation of Ally is dependent on the pH, moisture, and temperature of the soil. Refer to the label for details on rotation and minimum recropping intervals.

MINIMUM RECROPPING INTERVAL (MONTHS)

| SOIL PH | BARLEY, WHEAT | OAT* | CANOLA* | FLAX* | LENTILS | CANARY-SEED | YELLOW MUSTARD |
|---|---|---|---|---|---|---|---|
| less than 7.0 | 10 | 10 | 10 (22) | 10 (22) | 34 | 48 | 48 |
| 7.0 - 7.9 | 10 | 10 (22) | 22 (34) | 34 | 48 | 48 | 48 |

* Figures in brackets refer to recropping intervals in brown and dark brown soil zones. ALL OTHER DATA refer to recropping intervals in all soil zones.

On black and grey wooded soils with pH of 7.5 or less, fescue may be planted 10 months after application and alfalfa, red clover, peas and flax may be planted 22 months after application. Do not use on soils with pH greater than 7.9.

Effects of Ally residues on crops other than those listed in the table have not been fully evaluated. Because of the length of recropping restrictions and the lack of information on many rotational crops, Ally is not recommended for use on farms where special crops are grown (such as fababeans, beans, sunflowers, buckwheat, corn, sugar beets, etc.).

## Tank Cleaning:

Ally can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Ally should be flushed out immediately after Ally is used. The manufacturer recommends that sprayers used to apply this product be flushed 2 times with a water/household ammonia rinse (1 L of 3% ammonia per 100 L water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

For additional information refer to page 14.

## Hazard Rating:

☠ Caution Poison

Caution Eye Irritant

# Amitrol 240

**Herbicide Group – 11**
*(Refer to page 27)*

## Company:

Nufarm Agriculture (PCP#25684)

## Formulation:

231 g/L amitrole formulated as a liquid.
Container size - 10 L.

## Crops, Rates and Staging:

**Fall Stubble:** Perennial weed control prior to spring seeding. No planting restrictions for barley, canola, field corn, field pea, soybean, wheat, or white bean, but leave 8 months between application and the seeding of any other crops.

**Alfalfa stand renovation/removal:** 4 to 6 inches (10 to 15 cm) high.

**Pastures** (spot treatment only): For non-selective patch treatment of dandelion, Canada thistle, perennial sow-thistle, hoary cress, milkweed, poison ivy and toadflax apply 0.165 L in 25 L of water to treat a 10 m x 10 m area. For treatment of leafy spurge and horsetail, apply 0.460 L in 25 L of water to treat a 10 m x 10 m area. Do not mow treated plants for 3 weeks after application.

**Established shelterbelts:** up to 11.3 L per acre - Keep spray away from tree foliage or trunks.

**Pre-seeding:**

| CROP | RATE (L/ACRE) | Delay seeding after application |
|---|---|---|
| Barley, wheat, canola | 1.7 | 0 to 1 days |
| Field pea | 1.7 | 5 to 7 days |
| Soybean (low rate) | 1.7 | 6 days |
| Field corn, white bean, soybean (high rate) | 3.3 to 6.7 | 10 to 14 days |

Avoid using rates higher than 6.7 L per acre for preplant applications on very light textured soils with low organic matter, as crop damage can occur.

**Fallow areas:** Apply according to weed stage and rates below.

## Weeds, Rates and Staging:

**Fall stubble:** Canada thistle, perennial sow-thistle - Spray when thistle has 4 to 6 inches (10 to 15 cm) of new growth. Do not cultivate for 2 weeks after application. Do not apply after October 1. Do not replant crops in treated areas within 8 months of application except those registered for pre-seeding uses.

**Pre-seeding:** Dandelion and annual weeds Apply 1.7 L per acre to actively growing weeds less than 10 cm tall or across. Do not cultivate for 10 to 14 days after treatment.

**Fallow, Pastures and Shelterbelts:**

| WEED | RATE (L/ACRE) | WEED STAGE |
|---|---|---|
| Canada thistle | 5.0 to 6.7 | Early bud to bloom stage. |
| Cattails | 15.2 to 18.5 | After seed heads have formed. |
| Dandelion | 1.7 to 5.0 | Young and actively growing plants. |
| Hoary cress | 7.6 to 11.3 | Advanced rosette and bud stage. |
| Horsetail | 5.0 to 6.7 | Actively growing plants. |
| Leafy spurge | 15.2 to 18.5 | Advanced flowering to early seed set |
| Milkweed | 7.6 to 11.3 | Early summer after majority of shoot emergence. |
| Perennial sow-thistle | 5.0 to 6.7 | Early bud to bloom stage. |
| Poison ivy | 3.7 | Fully developed green foliage. |
| Toadflax | 7.6 to 11.3 | Advanced rosette to prebud. |

## Cost (2005 suggested retail price):

$6.70 per L.

## Application Information:

**Water Volume:**
***Fall stubble:*** 20 to 81 L per acre.
***Pastures, shelterbelts:*** 40 to 121 L per acre. For poison ivy, apply 202 to 405 L per acre.
***Pre-seeding:*** 20 to 81 L per acre.

**Pressure:** 45 psi (Less than 300 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Less than acceptable results may occur in dry weather.

## Tank Mixes:

**Herbicides:** Mix 1.68 L per acre Amitrol 240 with 0.5 L per acre Roundup for improved control of certain weeds, including dandelion. Follow directions on the Amitrol 240 and Roundup labels for timing and use precautions.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze treated crops or weeds or use for hay or feed.

**Recropping:** Do not plant any crop for 8 months following application except those registered for pre-seeding uses.

**Aerial Application:** Do not apply by air.

**Storage:** Do not store where temperatures may exceed 50°C or near open flames. Do not store below 4°C.

**Environment:** Do not contaminate any body of water. Use cautions to prevent spray, spray mist, or vapours from drifting off target. Spray drift may cause damage to crops or vegetation.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

☠ Caution Poison

Caution eye irritant

Avoid breathing spray mist or vapours.

Do not re-enter treated areas within 12 hours.

# Approve

**The Approve copack product has been removed from the market and replaced by a preformulated product. See Bromoxynil + 2,4-D Ester section on page 80.**

# Assert 300 SC

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

Nufarm Agriculture (PCP# 21032)

## Formulation:

**Assert:** 300 g/L imazamethabenz formulated as a suspension concentrate. Container size - 2 x 10.8 L jugs per case.

**pH adjuster:** 94.5% sodium bisulfate formulated as a soluble granule. Container size - 2 x 2.5 kg bags (1 bag per 10.8 L jug of Assert).

## Crops, Rates and Staging:

**pH adjuster:** 1 packet per jug of Assert to be used.

**Assert up to 0.67 L/acre (16.1 acres per jug):**
Barley, Spring wheat (including durum) - 1 to 6 leaf stage.
Annual Ryegrass (seed production only) – 4 to 6 leaf stage.

**Assert at 0.34 L/acre (32 acres per 10.8 L jug):**
Sunflower – plants (not under drought stress) that are in the 2 to 8 leaf stage. Crop must be less than 15 inches (38 cm) tall except for semi-dwarf varieties, which must be less than 12 inches (30 cm), and dwarf varieties, which must be less than 4 inches (10 cm). Stunting and head deformation can occur from applications made beyond recommended stages.

***Do not apply Assert to the same field more than once in two years.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Weeds, Rates and Staging:

**Assert at 0.34 L/acre rate:**
Stinkweed and Wild mustard - up to 6 leaves.

**Assert at 0.54 L/acre (20 acres per 10.8 L) – weeds above plus:**
Wild and tartary buckwheat (suppression) – up to 4 leaves.
Wild oats – majority from 1 to 3 leaves.

**Assert at 0.67 L/acre rate (16 acres per 10.8 L) – weeds above plus:**
Wild oats - 1 to 4 primary leaves.

## Cost (2005 suggested retail price):

Cereals and Annual Ryegrass - $13.65 to $17.21 per acre
Sunflower - $8.66 per acre (wild mustard only).

## Application Information:

**Water Volume:** In cereals only, Assert may be applied in 20 to 40 L of water per acre when applied alone or when tank mixed with dichloroprop+2,4-D, 2,4-D ester, or MCPA ester. For all other applications, apply in 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Do not apply Assert 24 hours before or after a frost. It works best at warm temperatures. Performs relatively consistently under dry conditions. If cold, wet soil conditions persist in the days after application, retillering of wild oats may occur. Do not apply to drought stressed sunflowers.

## Tank Mixes:

**Herbicides:**

Assert may be applied at either 0.53 L or 0.67 L per acre in tank mixes in the brown and dark brown soils, but must be applied at 0.67 L per acre when tank mixing in the black and grey wooded soils for adequate wild oat control.

***In spring wheat (including durum) and barley:***
2,4-D Ester* (up to 0.32 L/acre) (700 g/L formulations)
Curtail M (0.80 L/acre)
Dichlorprop + 2,4-D (0.7 L/acre) (Estaprop & Turboprop 600 only)*
Express Pack*** (40 acres per case)
Frontline (40 acres per case)
MCPA Ester* (up to 0.45 L/aere) (500 g/L formulations)
Puma$^{120}$ Super** (0.118 L/acre)
Puma$^{120}$ Super** + MCPA Ester, or Refine Extra (rates listed)
Refine Extra*** (8 g/acre)
Refine Extra*** (8 g/acre) + MCPA Ester (0.28 to 0.45 L/acre) (500 g/L formulations)
Spectrum (20 acres per case)
Unity*** (40 acres per case)

***In spring wheat (NOT including durum) and barley:***
Attain (40 acres per case)
Prestige (20 acres per case)

***In spring wheat and durum wheat only:***
Dichlorprop + 2,4-D (0.7 L/acre) (Turboprop 600 only)

* apply in 20 to 40 L of water per acre. For all other tank mixes use 40 L/acre

** use the 0.54 L/acre rate of Assert when tank mixing with Puma$^{120}$ Super.

*** when tank mixing dry broadleaf products, add products to the tank in the following order: dry broadleaf products, acidifier, Assert, and other liquid herbicides if required. For repeat tanks, dry broadleaf products need to be mixed with water to form a slurry prior to adding to the remaining spray solution in the tank.

Refer to Assert label for specific mixing order and application details when tank-mixing. Refer to tank mix partner for additional crop staging restrictions. Tank mixes containing Refine Extra must be used within 12 hours or product degradation may occur.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Assert label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours will reduce control.

**Grazing:** Do not graze treated fields or cut treated forage for silage or hay. Mature barley and wheat grain or straw from fields treated with Assert can be fed to livestock. Do not feed or graze treated annual ryegrass.

**Preharvest Interval:** Do not apply beyond the recommended crop stage.

**Recropping:**

***Do not apply Assert to the same field more than once in two years.***

| Year After Application | Black and Grey Wooded Soils | Brown and Dark Brown Soils |
|---|---|---|
| Year 1 | Spring wheat (including durum), barley, canola, field peas, flax, sunflowers | Spring wheat (including durum), CLEARFIELD canola, barley, sunflowers |
| Year 2 | Spring wheat (including durum), barley, canaryseed, canola, field peas, flax, oats, sunflowers | |

Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop not listed in the table. Lentils are known to be particularly sensitive to Assert residues in the soil. The additive effect of soil residues from the use of Assert and sequential applications of Ally or Unity (not for use in Manitoba) herbicides on the same land area has not been determined. Crop rotation guidelines are not known and injury to rotational crops other than wheat (excluding durum) may occur. Plant only wheat (excluding durum) on fields where these herbicides have been used until a field bioassay demonstrates other crops can be grown successfully.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze.

**Environment:** Leave a distance of 15 m between the outside boundary of the sprayed area and bodies of water (lakes, ponds, sloughs, streams, rivers, etc.).

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

# Assure II

**Herbicide Group – 1**
*(Refer to page 27)*

## Company:

E. I. duPont Canada (PCP#25462)

## Formulation:

96 g/L quizalofop-p-ethyl formulated as an emulsifiable concentrate. Container size – 8 L.

Sure-mix adjuvant. Container size – 8 L.

## Crops and Staging:

No leaf stage restrictions, but do not apply beyond preharvest intervals listed in the table:

| CROP | PREHARVEST INTERVAL (DAYS) |
|---|---|
| Canola | 64 |
| Dry bean (navy and pinto)* | 65 |
| Flax (including Solin) | 82 |
| Soybeans | 80 |
| Lentils | 65 |
| Peas (field and processing) | 65 |

**Forage Crops (no preharvest interval restrictions):** alfalfa (seed production), and seedling bird's-foot trefoil, sainfoin, clovers (white, red, alsike and sweet) for seed production* and creeping red fescue for seed*.

* *NOTE - Since applications to these crops have been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to these crops is at the risk of the user.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Costs (2005 suggested retail price):

$12.22 to $25.38 per acre.

## Application Information:

**Water Volume:** Minimum 40 L per acre. Up to 162 L per acre of water may be used under heavy populations to improve coverage.

**Pressure:** 30 to 40 psi (210 to 275 kPa).

**Nozzles:** Flat fan with 50 mesh or coarser nozzle screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Crop injury may occur if crops are stressed because of drought or flooding. Less than acceptable weed control may be expected if weeds are under stress because of drought, flooding or cool weather.

## Weeds, Rates and Staging:

Add Sure-Mix or Merge at 0.5 to 1.0 L per 100 L. Use 1.0 L per 100 L when wild oats or quackgrass are present in the field or when growing conditions are poor.

| WEED | STAGE | RATE | |
|---|---|---|---|
| | | L/ACRE | ACRES PER CASE |
| Wild oat* | 1 to 5 leaf prior to tillering | 0.15 | 54 |
| | up to 2 tillers | 0.20 | 40 |
| Green foxtail | 2 leaf to early tillering | 0.15 | 54 |
| Volunteer wheat, barley & oat* | 2 leaf to early tillering | 0.15 | 54 |
| Volunteer corn | 2 to 6 leaf stage | 0.15 | 54 |
| Barnyard grass,<br>Yellow foxtail,<br>Proso millet,<br>Fall pannicum,<br>Old witchgrass | 2 leaf to early tillering | 0.20 | 40 |
| Quack grass suppression | 2 to 6 leaf stage | 0.20 | 40 |
| Quack grass - season long control | 2 to 6 leaf stage | 0.30 | 26 |

* Best results are likely to occur if applications are made before tillering begins. Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Tank Mixes:

**Herbicides:**

***In Canola:*** Muster (8 to 12 g/acre).

***In Soybeans:***

Pinnacle (2.2 to 3.3 g/acre).

Assure II (0.25 L/acre) plus Pinnacle (2.2 to 3.3 g/acre) plus Basagran Forté (0.71 to 0.91 L/acre) plus Merge or SureMix to control grasses controlled by Assure II alone at 0.20 L/acre plus the broadleaf weeds controlled by Pinnacle and Basagran Forté.

***In Established creeping red fescue for seed:*** Assure II at 0.2 to 0.3 L/acre may be tank mixed with Ally (3 g/acre). Allow 24 hours after application before applying a broadleaf herbicide. If the broadleaf herbicide is applied first, wait 7 days before application of Assure II.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Assure II label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 1 hour of application may reduce control.

**Grazing:** Do not graze treated crops or cut for feed prior to crop maturity.

**Preharvest Interval:** See Crop chart above.

**Recropping:** No restrictions the year after treatment.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze.

**Environment:** Do not apply within 15 m of sensitive habitats such as shelterbelts, wetlands, sloughs, or woodlots.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Danger – Corrosive to eyes

Warning – Skin irritant

Potential skin sensitizer

# Atrazine

### Herbicide Group – 5

*(Refer to page 27)*

## Company:

**Syngenta**

(Aatrex Liquid – PCP#18450).

**United Agri Products**

(Atrazine 480 – PCP#20997, Atrazine 90 WG – PCP#23583).

## Formulations:

**Aatrex Liquid/Atrazine 480:** 480 g/L atrazine formulated as a liquid.

**Atrazine 90WG:** 90% atrazine formulated as a dispersible granule.

Container sizes - various.

## Crops and Staging:

May be applied to corn (silage, field, sweet) using the following applications:

Pre-plant incorporated (PPI).

Pre-emergent surface (after planting but before emergence of weeds and crop) - are recommended only on irrigated fields. Inconsistent weed control will occur if 0.5 inches (1.25 cm) of water/precipitation does not occur within 7 days of application.

Post-emergence - 1 to 6 leaf stage and when corn is less than 12 inches (30 cm) tall.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

For pre-plant incorporated, pre-emergent and post-emergent (when weeds are less than 4 inches or 10 cm tall) control of the following weeds:

Common purslane
Lamb's-quarters
Ragweed
Redroot pigweed
Smartweed (including lady's-thumb)
Volunteer clover
Wild buckwheat
Wild mustard
Wild oats
Wormseed mustard

## Rates:

| | ATRAZINE 90 WG | ATRAZINE 480, AATREX LIQUID |
|---|---|---|
| Preplant incorporated;<br>Pre-emergence (irrigated corn only) | 0.45 to 0.69 kg/acre | 0.85 to 1.25 L/acre |
| Post-emergence | 0.45 to 0.69* kg/acre | 0.85 to 1.25* L/acre |

* Add 1.11 to 2.23 L/acre of oil concentrate or 6.88 L/acre crop oil with post-emergence applications of these products. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Crop injury may occur when Atrazine and oil is applied post-emergence during cold weather.

Use the low rate on crops grown on sandy soils, and where weed infestations are light.

## Cost (2005 suggested retail price):

Aatrex Liquid - $7.26 per L
Atrazine 480 - $7.30 per L
Atrazine 90WG - $12.47 per kg

## Application Information:

**Water Volume:** Minimum 61 L per acre.

**Pressure:** 30 to 45 psi (200 to 300 kPa).

**Nozzles:** Flat fan with 50-mesh or coarser screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Post-emergent applications made during periods of cold weather may cause crop lightening. Hot, dry weather preceding post-emergent applications may result in reduced weed control. Atrazine will move with soil if eroded.

## Tank Mixes:

**Herbicides:**

Pre Plant Incorporated◆ - Eradicane (not sweet corn), Dual II Magnum
Pre-Emergent - Dual II Magnum
Post-Emergent*,◆ - Banvel II (not sweet corn), Pardner, Dual II Magnum.

- ◆ Aatrex Liquid only
- * Do not use oils or adjuvants with post-emergent tank mixes.

**Fertilizers:** For pre-emergence applications, nitrogen solutions or complete liquid fertilizers may replace all or part of the water as a carrier for some formulations of atrazine. Aatrex Liquid may be impregnated onto dry granular fertilizers. Do not impregnate onto nitrate or super-phosphate.

Do not apply atrazine with nitrogen fertilizer after corn has emerged, as crop injury will occur.

**Insecticides:** None registered.

**Note: The above mixes are those listed on the atrazine labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

## Restrictions:

**Rainfall:** Within 2 hours of postemergence applications may result in reduced weed control.

**Grazing:** Do not graze or cut for feed before ear emergence.

**Preharvest:** Leave at least 45 days from application to harvest.

**Recropping:** All crops, except corn and triazine-tolerant canola, may be affected the year following the use of atrazine. Flax, peas and fababeans have some tolerance to atrazine residues and are usually not affected by rates of up to 0.9 L/acre (500 g/L formulations) or 0.5 kg/acre (90 percent atrazine formulations) applied the previous year. Other more sensitive crops may be affected 2 or more growing seasons after application.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze Aatrex Liquid or Atrazine 480.

**Environment:** Do not mix or load within 30 m, or apply within 10 m, of any wells, lakes, streams, ponds, dugouts or sinkholes.

## Tank Cleaning:

When finished spraying atrazine, run clean water through the tank, pump and lines. Drain and refill with 1 L of 3% household ammonia solution per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

## Hazard Rating:

◈ Warning Poison (Atrazine 90WG)

NOTE: While Atrazine 90WG is the only product with a hazard rating, other formulations of atrazine could be expected to have similar hazard ratings if rated.

# Attain

## Herbicide Group – 4

*(Refer to page 27)*

## Company:

Dow AgroSciences

## Formulation:

The Attain package has 2 components:
**Attain A(PCP#24834):** 180 g/L fluroxypyr
**Attain B (PCP#24833):** 564 g/L 2,4-D LV ester.
Both formulated as emulsifiable concentrates.

Container sizes - Attain A - 9.6 L, Attain B - 2 x 8 L.

## Crops and Staging:

Spring wheat (including durum), barley - 4 leaf to flag leaf stage.

**Forage Grasses for seed production only*:**

Seedling grasses at the 2 to 4 leaf stage
Established grasses at the 4 leaf to flag leaf stage.

Bromegrass (Meadow, Smooth)
Fescue (Creeping red, Tall)
Timothy
Wheatgrass (Crested, Intermediate)

* *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program , the manufacturer assumes no responsibility for herbicide performance.* ***Those who apply these uses do so at their own risk.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds controlled at the 2 to 4 leaf stage, unless specified:**

Bluebur
Burdock
Cleavers (1 to 4 whorls)
Clover (sweet)
Cocklebur
Field horsetail*
Flixweed
Ragweed
Round leaved mallow (1 to 6 leaf)
Shepherd's-purse
Stinkweed
Stork's-bill (1 to 8 leaf)
Goat's beard
Hoary cress*
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Plantain
Prickly lettuce
Sunflower (annual)
Vetch
Volunteer canola
Volunteer flax (1-12cm)
Wild radish
Wild buckwheat (1 - 4 leaf)
Wild mustard

**Weeds controlled only when growing rapidly (control may be reduced when weed infestations are heavy):**

Blue lettuce*
Dandelion**
Docks
Dog mustard
Field bindweed*
Field peppergrass
Gumweed
Hedge bindweed
Lady's-thumb
Leafy spurge*
Oak-leaved goosefoot
Redroot pigweed
Russian thistle
Smartweed
Tansy
Tartary buckwheat

**Weeds suppressed:**

Annual sow-thistle
Canada thistle*
Common chickweed up to 3 inches (8 cm) in height
Hemp-nettle (2 to 6 leaf stage)
Perennial sow thistle*

* Top growth only
** Spring rosettes only.

## Cost (2005 suggested retail price):

$9.25 per acre.

## Rate:

Apply Attain A at 0.24 L/acre and Attain B at 0.40 L/acre. One case of Attain treats 40 acres. Make only one application per year.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 45 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa)

**Nozzles:** Use nozzles that deliver a uniform coverage while minimizing fine droplets prone to drift.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Attain activity is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

## Tank Mixes:

**Herbicides:**

***In spring wheat (including durum) and barley:***
Achieve Liquid (0.2 L/acre) plus Turbocharge adjuvant.*
Assert (0.53 to 0.65 L/acre)

***In spring wheat (including durum) only:***
Horizon (93 mL/acre) plus Score adjuvant.*
Puma$^{120}$ Super (0.16 to 0.31 L/acre)
Everest (17.4 g/acre) plus recommended surfactant

**Fertilizer:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

*Temporary crop injury (Achieve only) or reduced wild oat control may occur with these tank mixes.

**Note: The above mixes are those listed on the Attain label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not permit lactating dairy animals to graze fields within 7 days of application. Do not harvest forage or cut hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

**Preharvest Interval:** Leave 60 days between application and harvest.

**Recropping:** Wheat, barley, oats, rye, forage grasses, flax, canola, mustard, lentils and peas may be grown the year after an Attain application. There are no recropping restrictions the second year after application.

**Aerial Application:** Do not apply by air.

**Storage:** May be frozen. If frozen, bring to room temperature and agitate before use. This product is combustible. Do not store near heat or open flame.

**Environment:** Avoid drift onto non-target areas. Leave a buffer of 15 meters from water bodies, wetland areas and plants that may be injured by Attain.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

☠ Danger Poison.

Warning Eye Irritant.

Caution Skin Irritant.

# Avadex BW/ Avadex MicroActiv

**Herbicide Group – 8**
*(Refer to page 27)*

## Company:

Gowan Canada
(Avadex BW Liquid - PCP#8167)
(Avadex Micro-Active - PCP#25112)

## Formulation:

400 g/L triallate formulated as an emulsifiable concentrate.
Container sizes - 22.7 L, 115 L.

10% triallate formulated as a granular.
Container size - 22.7 kg, 454 kg.

## Crops, Rates and Application Timing:

**Avadex Liquid Rates – Spring Treatment**

| CROP | APPLICATION TIMING | RATE (L/acre) Organic Matter 4% or less | RATE (L/acre) Organic Matter Greater than 4% | ACRES TREATED PER 22.7 L CONTAINER Organic Matter 4% or less | ACRES TREATED PER 22.7 L CONTAINER Organic Matter Greater than 4% |
|---|---|---|---|---|---|
| Spring and durum wheat | Before Seeding*<br>After Seeding | 1.21<br>1.42 | 1.42<br>1.72 | 18.8<br>16.0 | 16.0<br>13.2 |
| Barley | Before and After Seeding | 1.42 | 1.72 | 16.0 | 13.2 |
| Canola, flax, mustard | Before Seeding | 1.72 | 2.23 | 13.2 | 10.2 |
| Peas (dry) | Before Seeding | 1.72 | 1.72 | 13.2 | 13.2 |

* Do not apply this product before seeding wheat in soils with 4 percent or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

**Avadex Granular Rates – Fall Treatment**

| CROP | RATE (KG/ACRE) Organic Matter Less than 2%* | RATE (KG/ACRE) Organic Matter 2-4% | RATE (KG/ACRE) Organic Matter Greater than 4% | ACRES TREATED PER 22.7 KG CONTAINER Organic Matter Less than 2%* | ACRES TREATED PER 22.7 KG CONTAINER Organic Matter 2-4% | ACRES TREATED PER 22.7 KG CONTAINER Organic Matter Greater than 4% |
|---|---|---|---|---|---|---|
| Spring and durum wheat | 4.45 | 5.67 | 6.88 | 5.1 | 4.0 | 3.3 |
| Barley, canaryseed | 4.45 | 5.67 | 6.88 | 5.1 | 4.0 | 3.3 |
| Canola, flax, mustard | 5.67 | 6.88 | 8.90 | 4.0 | 3.3 | 2.6 |

* Fall treatments conducted under minimum tillage are not recommended on soils with less than 2 percent organic matter.

**Avadex Granular Rates – Spring Treatment**

| CROP | APPLICATION TIMING** | RATE (KG/ACRE) | | ACRES TREATED PER 22.7 KG CONTAINER | |
|---|---|---|---|---|---|
| | | Organic Matter | | Organic Matter | |
| | | 4% or less* | Greater than 4% | 4% or less* | Greater than 4% |
| Spring and durum wheat | Before seeding***<br>After seeding | 4.45<br>5.67 | 5.67<br>6.88 | 5.1<br>4.0 | 4.0<br>3.3 |
| Barley, canaryseed | Before and after seeding (barley only) | 5.67 | 6.88 | 4.0 | 3.3 |
| Canola, flax, mustard | Before seeding | 6.88 | 8.90 | 3.3 | 2.6 |

* Minimum tillage treatments must be applied to fields with at least 2 percent organic matter.

** Minimum tillage treatments must be applied 10 to 14 days before seeding or incorporating. For minimum tillage treatments on spring and durum wheat, apply 5.67 kg/acre on soils with 4% organic matter or less and 6.88 kg/acre on soils with greater than 4 percent organic matter.

*** Do not apply this product before seeding wheat in soils with 4% or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

**Seedling Forage Legumes (under-seeded only):**

Apply recommended rates for the companion crop.

| | |
|---|---|
| Alfalfa | Bird's-foot trefoil |
| Clover (alsike, red, sweet) | |

## Weeds and Staging:

For pre-emergent control of Wild oats.

## Cost (2005 suggested retail price):

**Liquid:** N/A

**Granular:** $12.55 to $25.10 per acre.

## Application Information:

**Water Volume (Liquid formulations only):**
45 L per acre.

**Pressure:** 30 psi (200 kPa), liquid formulation only.

**Nozzles:** Flat fan, liquid formulation only.

**General Information:** The liquid formulation must be incorporated into soil that is free of lumps or trash. The liquid formulation is recommended for spring use because soils are left in an erosion prone state if the liquid is fall-applied. The granular formulation may be incorporated into trashy soil and is best suited for fall use.

***Fall Applications (Conventional Tillage):*** Apply Avadex granules to fields that are in good working condition, without excessive trash. Heavy trash or lumpy, wet fields may require tillage prior to application. Avadex must be applied after October 1 but before soil freeze-up. Application before October 1 may result in reduced weed control. Only one incorporation is required in the fall. The second incorporation may be done in the fall (before soil freeze-up) or in the spring.

***Fall Application (Minimum Tillage):*** Applications of Avadex granules should be made to standing stubble, chemical fallow, or summerfallow fields that are not prone to erosion. Do not apply to smooth, hard packed soils that may allow granules to drift. If excessive crop residue exists at the time of application, harrowing should be conducted to ensure the granules are in good contact with the soil. Apply when the soil begins to cool (less than 4°C) and within 3 weeks of soil freeze-up. Incorporation can be performed in the spring before seeding or as part of the seeding operation.

***Spring Application (Conventional Tillage):*** Apply Avadex (liquid or granules) to fields that are in good working condition, without excessive trash. Heavy trash or lumpy, wet fields may require tillage prior to application. Liquid formulations should be applied to fields with 30 percent or less trash cover. Avadex may be applied before or after seeding of wheat, barley, or canaryseed and before seeding of canola, flax, mustard or peas (liquid only). If wheat is being seeded into soils with an organic matter content of less than 4 percent, Avadex should be applied after seeding.

***Spring Application (Minimum Tillage):*** Avadex granules should be applied in spring and when the soil temperature is 4°C or less. Apply granules 10 to 14 days before incorporation. Do not apply more than 4 weeks before seeding is intended.

**Incorporation:**

***Conventional Tillage:*** Avadex applications require 2 incorporations, with the second incorporation at right angles to the first. Using a seeder that provides soil disturbance equivalent to a cultivator may replace 1 incorporation. The first incorporation of the granular formulation should be completed within 48 hours of application and the second incorporation should be delayed an additional 48 hours or more. The first incorporation of the liquid formulation should be completed as soon as possible after spraying, while the second incorporation may be done any time prior to crop emergence.

Incorporate to a depth of 2 inches (5 cm) by setting disc or cultivator implements to cut 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). Incorporations performed after seeding should be conducted with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective incorporation if compact soil prevents penetration of harrow teeth, if trash accumulates in the harrow sections, or if the harrows bounce.

***Minimum Tillage:*** Incorporation of Avadex granules in minimum tillage systems is achieved with one high disturbance incorporation, which can be conducted prior to seeding, or as part of the seeding pass. A high disturbance system is one that disturbs the soil enough so that emerged weeds are controlled by the operation (example - air seeder with cultivator shovels). Harrowing after the incorporation operation is recommended for best results.

For optimum results in minimum tillage systems, incorporate when wild oat growth is noticeable in the field, as this will ensure that the soil is warm enough for activation of Avadex.

Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the conventional tillage guidelines for incorporation.

***Summer Fallow:*** Incorporation can be done by a disc followed by harrowing at right angles, a vibrashank cultivator followed by harrowing at right angles, or double harrowing. The second operation can be delayed until spring. If summerfallow must be ridged to prevent soil erosion the granular formulation should not be used in the fall. Note that fall minimum tillage applied granules do not require incorporation in the fall. If soils must be ridged following application of the liquid formulation, ridging depth should be kept to a minimum as deep ridging may reduce wild oat control and increase crop injury.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Reduced control may result if prolonged cool conditions or dry soil conditions prevail at the time weeds are emerging. If conditions are dry or wild oats germinate from below the treated zone, the weeds may emerge, but will usually be controlled. Thinning of wheat can occur under conditions of heavy rainfall or if cold soil conditions persist as the crop emerges.

## Tank Mixes:

**Herbicides:** Avadex liquid may be tank mixed with liquid formulations of trifluralin for control of wild oats, green and yellow foxtail in wheat and barley. Apply after seeding but prior to crop emergence. Consult the recommendations for trifluralin for rates in different soil types.

**Fertilizer:** Avadex liquid alone, or tank mixed with liquid formulations of trifluralin, may be tank mixed with liquid fertilizer. Compatibility of the herbicide and liquid fertilizer should be checked. Follow the instructions on the herbicide label prior to adding the herbicide to the spray tank.

Avadex liquid may be sprayed on dry urea fertilizer. A minimum of 150 kg/ha (60 kg/acre) of dry urea fertilizer must be used. Only commercial blending is recommended.

**Insecticides:** None registered.

**Note: The above mixes are those listed on the Avadex labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** At least 0.5 inches (1.5 cm) within 2 weeks of application is required for activation.

**Grazing:** Do not graze the treated crop or use as hay or feed prior to crop maturity or in year of treatment.

**Recropping:** Do not seed tame oats the year after treatment.

**Aerial Application:** May be applied by air with attachments designed for applying low volumes of granules.

**Storage:** Do not freeze liquid formulations. Store granular formulations in a cool, dry place.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◈ Warning Poison (liquid formulation)

Skin and Eye Irritant (granular formulation)

# Avenge 200 C

**Herbicide Group – 8**
*(Refer to page 27)*

*** Note Avenge is no longer manufactured, but stocks still remain in some retail outlets. Avenge may be removed from future editions of this publication.**

## Company:

BASF Canada (PCP#12853)

## Formulation:

200 g/L difenzoquat formulated as a solution.
Container size - 20 L.

## Crops and Staging:

Apply up the 6 leaf stage of cereal and grass crops:
Barley
Canaryseed
Fall rye (Cougar, Frontier, Kodiak, Puma, Rymin only)
Triticale (Carman and Welsh)
Wheat (AC Barrie, Biggar, Bluesky, CDC Makwa, CDC Teal, Columbus, Conway, Cutler, Fielder, Genesis, Glenlea, Katepwa, Lancer, Leader, Neepawa, Oslo, Pasqua, Selkirk and Wildcat wheat varieties).
Winter wheat (Norstar only)

**Forages (only when underseeded to wheat and barley varieties listed above):**

Alfalfa
Bird's-foot trefoil
Bromegrass
Creeping red fescue
Crested wheatgrass
Kentucky bluegrass
Meadow fescue
Orchardgrass
Red clover
Reed canarygrass
Russian wild ryegrass
Sweet clover
Timothy

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

Wild oats at the 3 to 5 leaf stage.

## Cost (2005 suggested retail price):

$18.56 to $22.47 per acre.

## Rate:

Apply Avenge 200 C at 1.42 to 1.72 L/acre. Use the higher rate if wild oat population exceeds 200 wild oats per square metre.

One 20 L container treats 14.1 to 11.6 acres.

## Application Information:

**Water Volume:**
*Ground application:* 40 L per acre.
*Aerial application:* 8 to 20 L per acre
**Pressure:** 40 psi (275 kPa).
**Nozzles:** Flat fan directed 45° forward.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Crop injury is worse on cold or hot, humid days than when temperatures are moderate. Best weed control is attained when temperatures are 20 to 30°C, particularly when these temperatures follow application. Do not spray when crop or weeds are wet with heavy dew or rain. Do not apply when crop is under stress from drought, excessive moisture, or heat.

## Tank Mixes:

**Herbicides:**

*In wheat and barley:*
2,4-D ester (up to 0.45 L/acre of 500 g/L formulation). Do not use amine formulations.
2,4-DB (see 2,4-DB section for rates). May be used on cereals underseeded to forages.
Ally (2 to 3 g/acre)*
Ally + MCPA ester*
Buctril M (0.4 L/acre)
Curtail M (0.8 L/acre)
Dichlorprop + 2,4-D (0.71 L/acre)
MCPA ester (up to 0.45 L/acre of 500 g/L formulation). Do not use amine formulations.
Pardner (0.405 to 0.485 L/acre)
Pardner + MCPA ester
Refine Extra (8 g/acre)
Thumper (0.4 L/acre)

***In canaryseed:***
MCPA ester (0.38 to 0.45 L/acre of 500 g/L formulation)
Pardner (0.405 L/acre)
*No additional adjuvant required.

**Insecticides:** None registered

**Fertilizers:** None registered.

**Fungicides:** None registered.

Allow a 5-day interval between the application of Avenge and other pesticides.

**Note: The above mixes are those listed on the Avenge label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours of application will reduce control.

**Grazing:** Do not graze or feed treated cereal crop for 8 weeks after treatment. Do not graze or feed treated forages in the year of treatment. Straw from treated fields can be fed to livestock 8 weeks after application.

**Preharvest Interval:** Do not apply beyond the recommended crop stage.

**Recropping:** No restrictions the year after treatment.

**Aerial Application:** May be applied by air.

**Storage:** May be frozen.

**Environment:** Do not contaminate water bodies (sloughs, dugouts, lakes, streams, ponds, etc.).

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◈ Warning Poison

# Banvel II

**Herbicide Group – 4**
*(Refer to page 27)*

**See dicamba on page 89.**

# Basagran/Basagran Forté

**Herbicide Group – 6**
*(Refer to page 27)*

## Company:

BASF Canada

Basagran (PCP#12221)
Basagran Forté (PCP#22006)

## Formulation:

480 g/L bentazon formulated as a solution in both products. Basagran Forté has a built-in adjuvant.

Container size - 2 x 9 L jugs.

## Crops and Staging:

**Basagran and Basagran Forté:**

| CROP | STAGE |
|---|---|
| Soybeans | No restrictions |
| Dry beans | After the first trifoliate leaf |
| Corn | No restrictions |
| Peas* | After 3 pairs of leaves |
| Fababeans | At least 4 inches (10 cm) tall |
| Flax | After 2 inches (5 cm) in height |

**Basagran Forté only:**

| CROP | STAGE |
|---|---|
| Forage millet and Forage sorghum* | 3 to 6 leaf prior to canopy closure |

**Basagran only:**

| CROP | STAGE |
|---|---|
| Spring wheat (excluding durum)** | No restrictions (limited to the 4 leaf to flag leaf by 2,4-D staging) |
| Solin | After 2 inches (5 cm) in height |
| Forage grasses for seed production*: Bromegrass, creeping red fescue, crested wheatgrass, meadow foxtail, orchardgrass, timothy. | 1 to 7 leaf stage |
| Forage legumes (seedlings) for seed production*: Alfalfa, alsike clover, red clover, sainfoin. | After the third trifoliate leaf |
| Alfalfa for seed production. | Established prior to flowering |
| Sweet clover for seed production. | 3 to 10 inches (7.5 to 25 cm) high |

* One application per season.

** Basagran only at 0.4 L/acre. Must be tank mixed with 2,4-D (no adjuvant required).

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Cost (2005 suggested retail price):

**Basagran:** $29.43 per L not including adjuvant.

**Basagran Forté:** $ 23.30 per L adjuvant included in formulation.

## Weeds, Rates and Staging:

**Add Assist or XA oil concentrate at 0.41 to 0.81 L/acre to Basagran only. Basagran Forté does not require the addition of Assist or XA oil concentrate. If hot, humid conditions prevail (above 28°C and 80% relative humidity), use only the low rate of Assist or XA oil concentrate.** Citowett Plus may be used on peas at 0.25 L per 100 L spray mixture.

Apply the rate listed when weeds in the table are within the recommended height:

| ANNUAL WEEDS | 0.71 L/acre | | 0.91 L/acre | |
|---|---|---|---|---|
| | **Inches** | **Maximum Leaf Stage** | **Inches** | **Maximum Leaf Stage** |
| Buttercup | | | 2 to 4 | 6* |
| Cleavers | | | 1 to 3 whorl stage | |
| Cocklebur | 3 to 7 | 6* | 7 to 12 | 10* |
| Common chickweed | | | 1 to 3 weeks after emergence | |
| Common groundsel | | | 2 to 4 | |
| Common ragweed | | | 1 to 2 | 6 |
| Corn spurry | | | 1 to 4 | |
| Giant ragweed | | | 2 to 6 | 4 |
| Hairy galinsoga | | | 2 to 3 | 6* |
| Hairy nightshade | | | 0.2 to 0.8 | 6 |
| Lady's-thumb (smartweed) | 1 to 3 | 6* | 3 to 8 | 10 |
| Lamb's-quarters | | | 0.5 to 1.0 | 8 |
| Purslane | | | 1 to 2 | 6 |
| Redroot pigweed (suppression only) | | | 0.5 to 1.5 | 4 |
| Russian thistle (suppression only*) | | | 1 to 3 | 4* |
| Shepherd's-purse | Rosette to 4 | 6* | 4 to 10 | 6 |
| Stinkweed | Rosette to 2 | 6* | 2 to 6 | 6 |
| Stork's-bill | | | 1.5 to 4 | 2 to 6 leaf stage |
| Flower of an hour | 1 to 2 | 6* | 2 to 4 | 10* |
| Volunteer canola | 0.75 to 6 | 8 | 0.75 to 6 | 8 |
| Wild mustard | 1 to 5 | | 5 to 10 | 10 |
| Wild radish | | | 1 to 2 | 6 |
| PERENNIAL WEEDS | Repeat application 7 to 15 days after first application (if necessary) | | | |
| Canada thistle | 6 to 8 | | | |
| Field bindweed | 1 to 2.5 | | | |
| Yellow nutsedge | 6 to 8 | | | |

*Applies to Basagran Forté only.

Basagran may be applied in wheat at 0.4 L/acre when tank mixed with 2,4-D amine or ester (500 g/L) at 0.3 to 0.4 L/acre to control Lady's-thumb, redroot pigweed and daisy fleabane in addition to the weeds controlled by 2,4-D. No adjuvant is required for this mix.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 to 160 L per acre. A minimum of 80 L per acre. is recommended for optimum control.*

**Pressure:** 40 to 60 psi (275 to 425 kPa)*

**Nozzles:** Flat fan nozzles capable of delivering high water volumes. Direct nozzles 45° forward.

* Higher water volumes and pressures should be used when the weeds are at the upper end of their recommended treatment stage.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Poor results will occur if temperatures are cool. Optimum results are achieved when applied at daytime temperatures between 20 and 28°C. Applications at temperatures greater than 28°C may result in crop injury.

## Tank Mixes:

**Herbicides:**

***In soybeans:***

Pinnacle at 2.2 to 3.2 g/acre.

***In dry beans** (in the Red River Valley of Manitoba only):*

Basagran only at 0.71 L/acre can be tank mixed with Reflex at 0.23 L/acre plus Agral 90.

***In spring wheat** (not including durum):*

Basagran only at 0.4 L/acre can be tank mixed with 2,4-D amine or ester (500 g/L) at 0.3 to 0.4 L/acre. This tank mix DOES NOT need any adjuvant.

**Fertilizers:** Use of fertilizer mixes is not recommended for the western Canadian environment.

**Insecticides:** None registered.

**Fungicides:** None registered.

When mixing Basagran Liquid or Basagran Forté refer to the tank mix partner label for any additional restrictions and precautions.

Allow 4 days between application of Basagran and other herbicides, fertilizers or insecticides.

**Note: The above mixes are those listed on the Basagran/Basagran Forté labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 to 8 hours will reduce control.

**Grazing:** Allow 30 days between treatment with Basagran Forté and harvest of forage sorghum and millet for hay. Otherwise do not graze treated crops or cut for feed prior to crop maturity.

**Preharvest Interval:** 50 days for Basagran + 2,4-D in wheat, 84 days for Basagran + Reflex in Dry beans in Manitoba. Other uses are restricted only by appropriate staging.

**Recropping:** No restrictions the year after application.

**Aerial Application:** May be applied by air for weed control in dry beans or soybeans only. Use 23 to 45 L/acre water volume. Assist or XA oil concentrate at 0.05 to 0.1 L/acre must be added. Do not use Assist or XA oil concentrate in excess of 0.1 L/acre as substantial crop injury could occur. Do not apply fertilizer mixes in soybean or 2,4-D tank mix in wheat by air. Crop canopy should not cover the weeds.

**Storage:** May be frozen.

**Environment:** Avoid drift onto non-target areas. Do not contaminate domestic, irrigation or natural water sources.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

▽ Caution Poison – Basagran

◈ Warning Poison – Basagran Forté

# Bromoxynil

**Herbicide Groups – 6**
*(Refer to page 27)*

## Company:

Bayer CropScience (Pardner) - PCP#18001
Nufarm Agriculture (Koril 235) - PCP#25341

## Formulation:

**Pardner:** 280 g/L bromoxynil formulated as an emulsifiable concentrate.
Container size - two 8 L containers per case.

**Koril 235:** 235 g/L bromoxynil formulated as an emulsifiable concentrate.
Container size – two 9.71 L containers per case.

## Crops and Staging:

**Registered uses for both Pardner and Koril 235:**

| CROP | STAGE |
|---|---|
| Barley, oats, triticale, wheat (spring and durum) | 2 leaf stage to early flag |
| Winter wheat | 2 to 4 leaf stage (fall application) First growth to early flag leaf (spring application) |
| Corn (field or sweet) | 4 to 8 leaf |
| Corn (field or sweet) with drop pipes | Beyond 8 leaf |
| Canaryseed | 3 to 5 leaf |
| Seedling alfalfa | 2 to 6 trifoliate leaf stage |
| Established alfalfa (seed production only) | In spring, before the crop begins to shield weeds. Apply no more than twice in one growing season. |
| Fall rye | In spring only, from first growth to early flag |
| Flax (including Solin) | 2 to 4 inches (5 to 10 cm) |

**Registered uses for Pardner only:**

| CROP | STAGE |
|---|---|
| Forage millet and sorghum | 4 leaf to 8 inches (20 cm) |
| Seedling grasses: Bromegrass, Fescue (creeping red, meadow), Orchardgrass, Reed canary grass, Russian wild ryegrass, Timothy, Wheatgrass (crested, intermediate, slender, tall) | 2 to 4 leaf |
| Summerfallow | Apply according to weed stage. |

## Weeds and Staging:

**Weeds controlled at the 1 to 4 leaf stage:**

American nightshade
Annual smartweed (green, pale, lady's-thumb)
Bluebur
Cocklebur
Common ragweed
Cow cockle*
Kochia**
Pigweed*
Stinkweed*
Russian thistle**
Wild mustard*

* Use high rate.
** Apply before plants are 2 inches high.

**Weeds controlled at the 1 to 8 leaf stage:**

Common groundsel
Lamb's-quarters
Tame buckwheat
Tartary buckwheat
Wild buckwheat

## Cost (2005 suggested retail price):

**Pardner:** $8.72 to $10.57 per acre.

**Koril:** $8.95 to $10.85 per acre.

## Rate:

**Pardner:** 0.405 to 0.486 L/acre (one 8 L container treats 20 to 16.5 acres).

Canaryseed, flax, seedling alfalfa, forage millet and sorghum - 0.405 L/acre (one 8 L container treats 20 acres).

**Koril 235:** 0.486 to 0.57 L/acre (one 9.71 L container treats 20 to 17 acres).

Use the higher rates if weeds are at the more advanced stages of the recommended treatment stages.

## Application Information:

**Water Volume:**
***Corn, Millet & Sorghum:*** 80 to 120 L per acre.
***Seedling grasses:*** 60 L per acre.
***Other crops:*** 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Avoid spraying if temperatures are greater than 25°C. Leaf scorching may occur in corn and flax if applied during or after adverse growing conditions, such as cool and wet or hot (greater than 27°C) and humid weather.

## Tank Mixes:

**Herbicides:**

| CROP | PARDNER TANK MIXES |
|---|---|
| Spring wheat | 2,4-D, Achieve Liquid[†], Avenge, Avenge + MCPA (ester only), MCPA, Horizon |
| Winter wheat | 2,4-D, MCPA |
| Barley | 2,4-D, Achieve Liquid[†], Avenge, Avenge + MCPA (ester only), MCPA |
| Oats | MCPA |
| Fall rye, canaryseed | MCPA[*] |
| Flax | MCPA (amine, ester or K salt) |
| Seedling forage grasses[††] | MCPA |
| Corn | Accent[††◆] + surfactant, Atrazine[**], Banvel II (field corn only)[**] |

[*] The ester formulations are preferred but other formulations can be used.

[**] Do not add oil or surfactant to this mix. Do not use atrazine formulations that contain oil.

[†] Koril only.

[††] Pardner only.

[◆] *Since the use of this tank mix on corn is registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this tank mix on corn do so at their own risk.***

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the bromoxynil labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 1 hour of application will reduce control.

**Grazing:** Do not graze treated wheat, barley, oats or seedling alfalfa crops or cut for feed within 30 days of application.

Do not graze other treated crops or cut for hay prior to crop maturity.

**Recropping:** No restrictions.

**Aerial Application:** Registered for aerial application on wheat and barley. The use of low water volumes, 9 to 18 L per acre may result in less effective weed control than seen with ground application.

**Storage:** May be stored at freezing temperatures.

Will return to original state by warming to room temperature (20 to 22°C) and agitating thoroughly.

**Environment:** Avoid drift onto sensitive plants and contamination of water or wetland areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◈ Warning Poison

Danger Eye and Skin Irritant (Koril 235)

# Bromoxynil + 2,4-D Ester

**Herbicide Group – 4, 6**
*(Refer to page 27)*

## Company:

Bayer CropScience (Thumper) - PCP#22659
Nufarm Agriculture (Approve) - PCP#28123

## Formulation:

**Thumper:** 280 g/L bromoxynil and 280 g/L 2,4 D ester formulated as an emulsifiable concentrate.
Container size - 8 L.

**Approve:** 225 g/L bromoxynil and 225 g/L 2,4 D ester formulated as an emulsifiable concentrate.
Container size - 10 L.

## Crops and Staging:

Spring wheat (including durum) and barley at the 4 leaf to early flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds controlled at the 1 to 4 leaf stage:**

American nightshade
Ball mustard
Bluebur
Cocklebur
Common ragweed
Cow cockle
Flixweed
Green smartweed
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed
Shepherd's-purse
Volunteer canola
Volunteer sunflower

**Weeds controlled at the 1 to 8 leaf stage:**

Common groundsel
Lamb's-quarters
Stinkweed
Tame buckwheat
(4 leaf stage with Approve)
Tartary buckwheat
Wild buckwheat
Wild mustard

**Weeds Controlled from 1 to 12 leaf (max. 2 in. tall):**

Kochia
Russian thistle

## Cost (2005 suggested retail price):

**Thumper:** $6.68 per acre.
**Approve:** $6.35 per acre.

## Rates:

**Thumper:** 0.4 L/acre (one 8 L container treats 20 acres).
**Approve:** 0.5 L/acre (one 10 L container treats 20 acres).

## Application Information:

**Water Volume:**
*Ground:* 20 to 40 L per acre.
*Aerial:* 12 to 16 L per acre. Use the higher volume when there is a heavy crop canopy, or when the majority of weeds are cow cockle, smartweed, or pigweed.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** 80° or 110° flat fan nozzles. All strainer and nozzle screens must be 50 mesh or coarser.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Less than acceptable weed control may be expected if weeds are under stress because of excessive moisture, drought, or cool weather.

## Tank Mixes:

**Herbicides:**
***In spring wheat (including durum) and barley:***
Achieve Liquid (0.2 L/acre) plus Turbocharge aduvant
Avenge (1.4 to 1.7 L per acre)
Puma$^{120}$ Super (0.15 to 0.31 L/acre)
***In spring wheat (including durum) only:***
Horizon (93 to 117 mL per acre) plus Score adjuvant

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note: The above mixes are those listed on the Bromoxynil + 2,4-D Ester labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze or cut for livestock feed within 30 days of application. Withdraw meat animals 3 days before slaughter.

**Preharvest Interval:** Do not harvest within 30 days of application.

**Recropping:** No recropping restrictions the year after application.

**Aerial Application:** May be applied by air .

**Storage:** May be frozen. Shake well before using after being frozen.

**Environment:** Apply when wind is blowing lightly away from non-target areas and water bodies or wetland areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◈ Warning Poison

Caution Skin and Eye Irritant

# Bromoxynil+MCPA ester

**Herbicide Groups – 4, 6**
*(Refer to page 27)*

## Company:

Bayer CropScience (Buctril M) - PCP# 18022
Nufarm Agriculture (Mextrol 400 M) - PCP# 25342*
Nufarm Agriculture (Mextrol 450) – PCP#26999

Mahtkeshim Agan distributed by United Agri Products (Badge) - PCP# 16164

* Mextrol 400M is no longer manufactured, but quantities still remain in the retail system. Mextrol 400 M may be removed from future editions of this publication.

## Formulation:

**Buctril M:** 280 g/L bromoxynil present as heptyl and octyl esters and 280 g/L of MCPA ester formulated as an emulsifiable concentrate.
Container size - 8 L.

**Mextrol 400 M:** 200 g/L bromoxynil present as octyl ester and 200 g/L of MCPA ester formulated as an emulsifiable concentrate.
Container size – 11.36 L.

**Mextrol 450:** 225 g/L bromoxynil present as octyl ester and 225 g/L of MCPA ester formulated as an emulsifiable concentrate.
Container size – 10 L.

**Badge:** 225 g/L bromoxynil present as octyl ester and 225 g/L of MCPA ester formulated as an emulsifiable concentrate.
Container size – 10 L.

## Crops and Staging:

**Field Crops:**

***All Products:***

Barley, oats, spring wheat (including durum) - 2 leaf to early flag.
Winter wheat - 2 to 4 leaf stage in the fall or after growth resumes in the spring, but prior to early flag leaf.
Fall rye - apply from the time growth commences in spring to early flag leaf.
Canaryseed - 3 to 5 leaf stage.
Flax, Solin - 2 to 4 inches (5 to 10 cm) tall.
Corn - 4 to 6 leaf stage.

**Seedling forage grasses:**
2 to 4 leaf stage.

***All Products:***

Bromegrass
Fescue (creeping red, meadow)
Reed canarygrass
Russian wild ryegrass
Timothy
Wheatgrass (crested, intermediate, slender, tall)

***Buctril M and Badge only:***

Fescue (tall)
Meadow bromegrass
Meadow foxtail
Wheatgrass (streambank)

***Buctril M only:***

Orchard grass

**Established Forage Grasses:**
Timothy for seed (or hay with Buctril M and Mextrol 450 only) - apply prior to the emergence of the flag leaf.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds up to 4 leaf stage:**

American nightshade
Annual smartweeds (green, pale, lady's-thumb)
Bluebur
Ball mustard
Cocklebur
Cow cockle
Flixweed
Kochia**
Night-flowering catchfly
Redroot pigweed*
Russian thistle**
Scentless chamomile***
Shepherd's-purse
Volunteer canola
Volunteer sunflower

* May not be controlled in flax.
** Control before plants are 2 inches tall.
*** Spring seedlings only.

**Weed up to 6 leaf stage:**

Wild tomato (Buctril M & Badge only)

**Weeds up to 8 leaf stage:**

Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tame buckwheat
Tartary buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

**Weeds where top growth is controlled:**

Canada thistle
Perennial sow-thistle

## Cost (2005 suggested retail price):

**Buctril M:** $6.95 per acre
**Mextrol 400M:** $6.85 per acre.
**Mextrol 450:** N/A
**Badge:** $6.61 per acre.

## Rate:

**Buctril M:** 0.4 L per acre. One 8 L jug treats 20 acres.
**Mextrol 400 M:** 0.57 L per acre. One 11.36 L jug treats 20 acres.
**Mextrol 450:** 0.5 L/acre. One 10 L jug treats 20 acres
**Badge:** 0.5 L per acre. One 10 L jug treats 20 acres.

## Application Information:

**Water Volume:**

*Corn:* 80 to 120 L per acre.
*Flax, Solin:* 20 to 40 L per acre.
*Cereals:* 20 to 40 L per acre.
*Seedling forage grasses:* 60 L per acre.
*Established timothy:* 60 L per acre.
*Aerial:* 8 to 20 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan nozzles.

Refer to specific labels for recommended water volumes.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Best weed control when humidity is high at the time of spraying and for the following day or two. Prolonged cool conditions may result in reduced weed control. Spraying during early morning may increase the risk of flax injury.

Avoid spraying in temperatures greater than 25°C.

Do not apply to flax, canaryseed or corn if daytime temperatures exceed 27°C within 48 hours before or after application.

## Tank Mixes:

**Herbicide Tank Mix Table:**

Products listed below are at label rates for each crop. See labels for details.

| **CROP & TANK MIXES** | **Badge** | **Buctril M** | **Mextrol** |
|---|---|---|---|
| **Flax (✓✓ = also registered for use on Solin):** | | | |
| Fusion | | ✓✓ | ✓✓ |
| Poast Ultra + Merge adjuvant | ✓✓ | | ✓✓ |
| Select + Amigo adjuvant | ✓✓ | ✓✓ | ✓✓ |
| **Spring wheat (including durum) and Barley:** | | | |
| Achieve Liquid | | | ✓* |
| Ally | ✓ | ✓ | ✓ |
| Avenge | ✓ | ✓ | ✓ |
| MCPA (amine, ester & K) | ✓ | ✓ | ✓ |
| Puma$^{120}$ Super | | ✓ | ✓* |
| Refine Extra (2.7 g/acre)** | ✓ | ✓ | ✓* |
| Refine Extra + Puma$^{120}$ Super (rates above) | | ✓ | ✓* |
| **Spring wheat (including durum) only:** | | | |
| Everest | ✓ | | ✓* |
| Horizon | ✓ | ✓ | ✓ |
| **Winter Wheat:** | | | |
| Refine Extra (2.7 g/acre)** | ✓ | ✓ | ✓* |
| **Oats:** | | | |
| MCPA (amine, ester & K) | ✓ | ✓ | ✓ |

| CROP & TANK MIXES | Badge | Buctril M | Mextrol |
|---|---|---|---|
| **Corn:** | | | |
| Atrazine | ✓ | ✓ | ✓ |

* Not registered for use with Mextrol 400

** Requires the addition of a surfactant as per Refine Extra.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the bromoxynil + MCPA ester labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Rainfall within 1 hour of application may reduce weed control.

**Grazing:** Do not graze treated grain or established timothy crops or cut for feed within 30 days of application. Do not graze meadow foxtail in the year of treatment. Do not graze other treated forage grasses within 56 days of treatment.

**Preharvest Interval:** Do not harvest Flax or Solin within 60 days of application.

**Recropping:** No recropping restrictions the year after treatment.

**Aerial Application:** May be applied by air to wheat, barley, and oats only. Must be applied in 8 to 18 L per acre water volume. Use higher water volume when the majority of weeds are cow cockle, smartweed, hemp-nettle, pigweed, and Canada thistle.

**Storage:** May be frozen.

**Environment:** Apply when wind is blowing away from sensitive plants and water or wetland areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Warning Poison (Badge and Buctril M)

Danger Poison (Mextrol 400M, Mextrol 450)

Warning Skin Irritant (Mextrol 400M, Mextrol 450)

# Buctril M/Mextrol

**See Bromoxynil + MCPA section on page 81**

# Casoron

**Herbicide Group – 20**
*(Refer to page 27)*

## Company:

Crompton Co. (PCP#12533)
(distributed by United Agri Products)

## Formulation:

4% dichlobenil formulated as a granular.
Container size - 3 kg, 15 kg.

## Crops:

Poplar plantations

Shelterbelts consisting of the following species:

- Ash
- Barberry
- Birch (cutleaf-weeping)
- Boxwood
- Caragana
- Cedar (White, Eastern Red)
- Crabapple
- Elm
- Euonymus (Burning bush)
- Forsythia
- Honeysuckle
- Juniper
- Lilac
- Linden
- Locust
- Maple
- Mock orange
- Poplar
- Rose
- Spirea
- Willow

**NOTE: Do not apply to shelterbelts with mugo pine, firs, hemlock, holly, spruce or other shallow rooted species or injury may result. Do not apply in or around greenhouses. Do not use on light sandy soils.**

## Weeds and Staging:

Apply in early spring or late fall prior to annual weed emergence, or after cultivation has removed existing weeds.

- Annual blugrass
- Artemisia (absinthe,* wormwood, sage)
- Bindweed*
- Canada thistle*
- Chickweed
- Dandelion*
- Foxtail (green and yellow)
- Groundsel
- Horsetail
- Knotweed
- Kochia
- Lamb's-quarters
- Loosestrife
- Mustard
- Nutsedge*
- Pigweed
- Plantain
- Purslane
- Quack grass*
- Sheep sorel*
- Shepherd's-purse
- Smartweed
- Sow-thistle
- Spurge
- Vetch*
- Wild buckwheat*

* Controlled with fall applications at the higher rates.

## Cost (2005 suggested retail price):

$8.78 per kg.

## Rates:

45 to 70 kg/acre. At the low rate, a 15 kg bag will treat a 4 yd by 407 yd (4 m by 340 m) strip of shelterbelt. At the high rate, a 15 kg bag will treat a 4 yd by 256 yd (4 m by 214 m) strip of shelterbelt. If application is followed by 0.5 to 1.0 inches (1.3 to 2.5 cm) of irrigation, the lower rates are recommended.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Do not apply during periods of high soil temperatures (more than 15°C).

## Tank Mixes:

None registered.

## Restrictions:

**Grazing:** Do not graze in treated area.

**Storage:** Store in a cool, dry place. Do not freeze.

## Equipment Cleaning:

Refer to page 14.

## Hazard Rating:

No specific rating. Keep out of reach of children.

Harmful if swallowed.

Avoid skin or eye contact.

# Clethodim

**Herbicide Group – 1**
*(Refer to page 27)*

## Company:

Arysta LifeScience Canada (Select) - PCP#22625
Bayer CropScience (Centurion) - PCP#27598

## Formulation:

**Select:** 240 g/L of clethodim formulated as an emulsifiable concentrate. Container size - 3 L.

**Centurion:** 240 g/L of clethodim formulated as an emulsifiable concentrate. Container size - 3 L.

## Crops, Rates and Staging:

Crops are tolerant at all growth stages although maximum rates and preharvest intervals must be observed to prevent excess residue in the grain.

**To a maximum rate of 80 mL/acre:**

- Chickpeas*
- Dry beans (black, great northern, navy, pink, pinto, red)

**To a maximum rate of 150 mL/acre:**

- Alfalfa (seedling only)
- Canola
- Field peas
- Flax (including Solin)
- Lentils
- Mustard (brown, oriental, yellow)
- Potatoes
- Soybeans
- Sunflowers

* Apply up to the 9 node stage (7 inches or 18 cm maximum height).

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

| WEED | RATE (mL/ACRE) | ACRES TREATED PER 3 L CONTAINER | STAGE |
|---|---|---|---|
| Barnyard grass, green◊ and yellow foxtail◊, Proso millet, Volunteer cereals (barley◊, canary seed, corn, oat◊, wheat◊), Wild oat◊ (light infestations only*) | 50** | 60 | ◊2 to 4 leaf stage when treated with the 60 acre rate. For best results, apply at the 2 to 3 leaf stage. |
| Moderate to heavy infestations of the above grasses, plus Persian darnel | 80 | 40 | 2 to 6 leaf stage. For best results, apply at the 2 to 3 leaf stage. |
| Quackgrass (suppression only) | 80 | 40 | 2 to 6 leaf stage when 3 to 6 inches (6 to 15 cm) tall. For best results, apply at the 3 to 5 leaf stage. |
| Quackgrass (season long control) | 150*** | 20 | |

* The manufacturers do not provide guidelines for weed densities under light infestations. When in doubt as to the level of weed infestation, use the higher rate or contact the manufacturer.

** At this rate, clethodim should not be tank mixed with any other pesticide and should only be applied under the following growing conditions: good crop stand, within the recommended leaf staging (2 to 3 leaf is optimum timing) prior to tillering, light weed infestations, adequate moisture and fertility, absence of stress, and good growing conditions.

*** Apply with 10 L of Amigo per 1000 L of spray solution.

**Amigo:** 0.5 L of Amigo per 100 L of spray solution (unless otherwise indicated on the label)

Refer to the product labels for complete mixing instructions. A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

Select $11.08 to $33.25 per acre.

Centurion $11.06 to $33.20 per acre.

## Application Information:

**Water Volume:** 20 to 40 L per acre. 40 L per acre under dense weed infestations or dense crop canopies.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Stainless steel 80° flat fan nozzles tilted forward at a 45° angle.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Clethodim will be less effective when plants are stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Regrowth of tillers may occur if application is made under any of the above stress conditions.

## Tank Mixes:

Clethodim may be tank mixed with other pesticides at the 80 to 150 mL/acre rates. Add the recommended amount of Amigo with all tank mixes unless otherwise indicated.

**Herbicides:**

***In flax (not including solin):***
Buctril M (0.4 L/acre)
Curtail M (0.6 to 0.8 L/ac)*
MCPA ester (rates for flax).
Lontrel at 0.23 to 0.34 L/acre.*

***In solin (low linolenic flax varieties):***
Buctril M (0.4 L/acre)

***In canola:***
Lontrel at 0.17 to 0.34 L/acre*.
Muster at 8 to 12 g/acre* (redroot pigweed is controlled at the 8 g/acre rate of Muster in this tankmix).

***In Clearfield canola only:***
Pursuit at 40 to 85 mL/acre* At the low rate of Pursuit, the following weeds are controlled: chickweed, hempnettle, redroot pigweed* stinkweed, volunteer canola (NOT CLEARFIELD varieties) wild buckwheat*, wild mustard, plus weeds listed on clethodim labels.
*Light infestations only. For heavy infestations, use high rate of Pursuit.

***In Liberty Link canola only:***
Liberty at 1.1 to 1.35 L/acre plus clethodim at 25.5 mL/acre to enhance control of wild oat and volunteer cereals. When mixing add Amigo adjuvant to the water first, then Liberty, then clethodim. Consult labels for detailed mixing instructions.

***In field peas:***
Pursuit at 85 mL/acre.*

* Apply with the 80 mL/acre rate of clethodim only. Allow 4 days between application of clethodim and any other chemical not recommended as a tank mix combination on the label.

**Fertilizer:** None registered.

**Insecticide:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the clethodim labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 1 hour may reduce control.

**Grazing:** Do not graze or cut treated crops for forage until 60 days after application of clethodim to annual crops, and 30 days after application to seedling alfalfa.

**Preharvest Interval:** Do not apply within 60 days of harvesting canola, dry beans, flax (including Solin), lentils, potatoes, chickpeas (Desi and Kabuli) or mustard (brown, yellow, oriental). Do not apply within 75 days of harvesting soybeans or field peas. Do not apply within 30 days of harvesting seedling alfalfa. Do not apply within 72 days of harvesting sunflowers.

**Aerial Application:** Do not apply by air.

**Storage:** May be stored at any temperature. Shake well before use.

**Other:** Do not apply more than 0.15 L/acre to the same land area per season.

**Environment:** Leave a buffer of 15 meters between the last pass of the sprayer and open water, wellheads, wetlands and other non-target areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Warning Skin and Eye Irritant

# Curtail M

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

Dow AgroSciences (PCP#22764)

## Formulation:

50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.

Container size - 8 L.

## Crops and Staging:

Spring wheat (including durum), barley, oat canaryseed* and timothy (established for seed, and hay or forage production)* at the 3 leaf to just before the flag leaf stage.

Flax, Solin (low linolenic acid flax) at 2-6 inches (5 to 15 cm) height.

* *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Those who apply these uses do so at their own risk.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

The following weeds are controlled at the 1 to 4 leaf stage unless specified:

**At 0.61 L/acre (8L jug treats 13 acres) for light infestations of:**

Canada thistle***
Flixweed**
Lamb's-quarters
Shepherd's-purse**
Stinkweed**
Volunteer sunflower
Wild mustard

**At 0.8 L/acre (8L jug treats 10 acres) for medium to heavy infestations of the above weeds and:**

Annual sow-thistle
Canada Thistle***
Common groundsel
Dandelion*
Kochia (suppression only)**
Perennial sow-thistle
(top growth control only)
Redroot pigweed
Russian pigweed
Scentless chamomile**
Smartweed
Tartary buckwheat
Volunteer canola
Wild buckwheat

* Spring rosettes only

** 2 to 4 leaf stage, (spring seedlings only for winter annuals).

*** Season long control, some regrowth may occur in the fall. Apply from the 4 inch (10 cm) to prebud stage.

## Cost (2005 suggested retail price):

$8.46 to $11.00 per acre.

## Application Information:

**Water Volume:**
***Canary seed and timothy*** 40 to 80 L per acre
***All other crops*** 40 to 60 L/acre

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan nozzles tilted forward at a 45° angle.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

When weeds are stressed because of drought, flooding, hot or cool (less than 15°C) temperatures, weeds are not actively growing and control may be reduced. Do not apply to weeds stressed longer than 20 days from lack of moisture as poor control can result.

## Tank Mixes:

Curtail M at 0.8 L/acre should be used in all tank mixes unless otherwise indicated. See labels for adjuvant rates.

**Herbicides:**

***In spring wheat (including durum) and barley:***
Achieve Liquid (0.20 kg/acre) plus Turbocharge adjuvant
Assert (0.52 to 0.64 L/acre) plus water pH adjuster
Puma$^{120}$ Super (0.16 to 0.31 L/acre).

***In spring wheat (not including durum) and barley:***
Avenge (1.4 to 1.7 L/acre) no adjuvant required ◇*
Refine Extra (8 g/acre) plus a non-ionic surfactant with Curtail M at 0.61 L/acre.

***In spring wheat (including durum):***
Horizon (93 to 117 mL/acre) plus Score.
Everest (17.4 g/acre) plus Ag-Surf or Agral 90 adjuvant.

◇ Use the 0.66 to 0.8 L/acre rate of Curtail M only. The 0.66 L/acre rate will control weeds listed for the 0.61 L/acre rate above.

* See Avenge label for varietal restrictions. Allow a minimum of 5 days between the application of Curtail M plus Avenge and the application of any other pesticide, as poor weed control may result.

Check product labels for additional crop staging restrictions.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Curtail M label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours will reduce control.

**Grazing:** Do not graze treated fields or cut for hay within 7 days of application.

**Preharvest Interval:** Leave 60 days between application and harvest.

**Recropping:** Wheat, barley, oats, rye, corn, flax, canola, forage grasses and mustard may be planted the year after application. Do not underseed crops to forage legumes the year after treatment.

Do not seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.

Do not sow ***any other*** crops until the second year after application. Apply manure bedded with straw from treated crops only to the crops listed above.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool (above 5°C), dry area. If product is frozen, bring to room temperature and agitate before use.

**Environment:** Avoid drift onto sensitive plants and contamination of water or wetland areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

Caution Eye Irritant

# Dicamba

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

BASF Canada (Banvell II - PCP#23957)

Gharda (Oracle - PCP#26722) (distributed by United Agri Products and AgWest Inc.)

## Formulation:

480 g/L dicamba formulated as a solution.
Container sizes - 2 x 10 L jugs.

## Crops, Rates and Staging:

| CROP | STAGE | RATE | |
|---|---|---|---|
| | | (mL/acre) | Acres/10 L |
| Spring wheat* | 2 to 5 leaf. | 93 to 117 | 85 to 107.5 |
| Barley* | 2 to 5 leaf. | 93 | 107.5 |
| Oats* | 2 to 5 leaf. | 93 to 117 | 85 to 107.5 |
| Canaryseed* | 3 to 5 leaf. | 117 | 85 |
| Winter wheat* | In spring - 6 to 10 inches (15 to 25 cm) - prior to flag leaf | 93 to 117 | 85 to 107.5 |
| Spring rye* | 2 to 3 leaf | 93 to 117 | 85 to 107.5 |
| Corn, field | Broadcast up to 8 inches (20 cm).<br>When higher, use drop-nozzles.<br>Apply no later than 2 weeks prior to tassle emergence and prior to 20 inches (50 cm). | 243 to 505 | 20 to 41 |
| Corn, field + 2,4-D | | 117 | 85 |
| Red fescue | *Seedling:* 2 inches (5 cm) tall.<br>*Established:* up to the flag leaf stage. | 243 | 41 |
| Pastures | Established and actively growing | 840 to 1,860 (0.84 to 1.86 L) | 5.4 to 11.9 |
| Seedling grasses: Fescue (creeping red, meadow, tall), Meadow foxtail, Orchardgrass, Smooth bromegrass, Timothy, Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall) | 2 to 4 leaf | 93 to 117 | 85 to 107.5 |
| Fall stubble | Apply according to weed stage. | 1000 (1.0 L) | 10 |
| Fall stubble + glyphosate | Apply according to weed stage. | 500 | 20 |
| Pre-seeding cereals | Apply according to weed stage. | 127 | 79 |
| Chemfallow + 2,4-D | Apply according to weed stage. | 93 to 117 | 85 to 107.5 |
| Chemfallow + glyphosate | Apply according to weed stage. | 117 to 243 | 41 to 85 |

* Should be mixed with a tank mix partner for broad spectrum control

## Weeds, Rates and Staging:

Apply to annual broadleaf weeds at the 2 to 3 leaf stage and to winter annual rosettes up to 2 in. (5 cm) across.

**Dicamba applied alone at 0.093 to 0.117 L/acre will control:**

Cleavers (high rate only)
Cow cockle
Corn spurry
Canada thistle*
Lady's thumb
Perennial sow-thistle*
Smartweed (green)
Tartary buckwheat
Wild buckwheat

**Dicamba at 0.25 to 0.5 L per acre control the weeds above plus:**

Canada thistle**
Canada Fleabane
Field bindweed**
Mustard (hare's-ear, Indian, tumble, wild, wormseed)
Perennial sow-thistle**
Pigweed (redroot, Russian)
Ragweed (common, false, giant)

**Dicamba at 0.85 L/acre in rangeland or 1.0 L/acre in summerfallow will control the weeds above plus:**

Curled dock*
English daisy
Goldenrod

**Dicamba at 1.86 L/acre will control the weeds above plus:**

Diffuse knapweed
Goat's-beard
Ground cherry
Pasture sage
Povertyweed
Sheep sorrel
Thyme-leaved spurge

* Top growth only.

** Three consecutive years of treatment are required for complete control.

**Canada thistle, Perennial sow-thistle in summerfallow:** Apply prior to the bud stage. Must be applied to thistle plants with 6 to 10 inches (15 to 25 cm) of new growth.

**Brush control in pastures:** When brush is actively growing and is 6 feet (2 m) in height or less (in spring or early summer).

**Canada thistle control in fall stubble:** When thistles exhibit new growth and at least 2 weeks prior to a killing frost.

Refer to label for full lists of weeds controlled by dicamba plus tank mixes in cereals, pastures, summerfallow and other situations.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Cost (2005 suggested retail price):

Banvel II Cost per L - $38.18.
Oracle Cost per L - $38.83

## Application Information:

**Water Volume:**
*Preseeding burnoff:* 20 to 45 L per acre.
*Annual crops:* at least 45 L per acre.
*Pastures, summerfallow and stubble:* 45 to 90 L per acre.
*Corn:* 90 to 140 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Crop damage (stunting, reduced seed set) can occur if the chemical is applied at any time other than the recommended stage. Do not apply to crop under stress from adverse environmental conditions, such as excess moisture, drought and disease. Apply when air temperature is between 10 and 25°C.

Do not apply:

- when there is a risk of severe temperature fall in the night;
- under high humidity, temperatures above 30°C, or fog conditions, to prevent drift to sensitive crops;
- when wind is blowing toward a nearby sensitive crop;
- when winds are gusty up to 5 mph (8 km/hr).

## Tank Mixes:

**Herbicides:**

| | Spring wheat | Winter wheat | Barley | Oats | Seedling Grasses |
|---|---|---|---|---|---|
| 2,4-D amine (500g ai/L) (0.34 L/acre) | ✓ | ✓ | ✓ | | ✓ |
| MCPA Amine (0.34 L/acre) | ✓ | ✓ | ✓ | ✓ | ✓ |
| MCPA K (0.44 L/acre) | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sencor (0.11 to 0.17 L/acre) | ✓ | | ✓ | | |
| Ally (2 g/acre) | ✓ | | ✓ | | |

*In Canaryseed:* MCPA amine (0.34 L/acre)
*In Corn, Spring rye:* 2,4-D amine (500 g ai/L)(0.34 L/acre)
*In Corn (Banvel II only):*
Accent (13.5 g/acre) plus non-ionic surfactant
Option 35DF (40 g/acre) plus Hasten adjuvant plus liquid 28-0-0 (Banvel II at 0.12 L/acre) (Manitoba only).
*In Chemical fallow, stubble:* 2,4-D, glyphosate products.
*In Red fescue:* 2,4-D amine (0.61 L/acre)
*In Preseeding burnoff:* glyphosate (0.38 L/acre)

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Banvel II label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing and Harvest Intervals:**

***Canaryseed:*** Use only as birdseed.

***Corn:*** Do not graze cattle or harvest for silage until 7 days after treatment of dicamba or for at least 12 weeks following dicamba tank mixes with other herbicides.

***Cereals, seedling grasses, pasture:*** If treated vegetation has been consumed by meat animals within 30 days of dicamba application, feed the animal with untreated diet for 30 days before slaughter. Meat animals may graze or feed on treated pasture 30 days after dicamba application without restrictions on slaughter.

***Dairy cattle:*** no restrictions up to 0.50 L/acre.

Use the following guidelines for feeding dicamba treated forage to dairy animals:

| RATE/ACRE | DELAY BETWEEN TREATMENT AND HAYMAKING/ GRAZING (DAYS) |
|---|---|
| up to 0.5 L | 0 |
| 0.501 L to 0.93 L | 7 |
| 0.931 L to 1.86 L | 14 |
| 1.861 L to 2.87 L | 30 |

**Recropping:** Grow only cereals, corn, soybeans or white beans the year after treatment with the 1.0 L/acre rate. Grow only cereals, corn, field beans, soybeans or canola the year after applications of 0.5 L/acre. If applications are made after September 1, or if dry weather persists after application, crop injury may occur the following spring.

**Aerial Application:** May be applied by air on cereals only. Use a minimum of 8 L/acre.

**Storage:** May be stored at freezing temperatures.

**Environment:** Do not contaminate domestic or irrigation water. Do not apply around desirable trees or plants or near the root zone of these plants.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

☠ Caution Poison

Warning Eye Irritant

# Dicamba+Mecoprop+MCPA

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

Syngenta (Target – PCP#28028)
United Agri Products (Sword – PCP#27892)

## Formulation:

275 g/L MCPA, 62.5 g/L mecoprop-p and 62.5 g/L dicamba formulated as a solution.
Container size - 10 L.

## Crops and Staging:

**Cereals:**

| CROP | STAGE |
|---|---|
| Barley | 2 to 4 leaf (3 leaf for best crop safety) |
| Canaryseed, Oats, Spring wheat (including durum) | 2 to 5 leaf (3 to 4 leaf for best crop safety) |
| Winter wheat | spring application only; up to 12 inches (30 cm) high (top leaf extended) |
| Summerfallow | Fall stubble |

**Seedling grasses grown for forage only (NOT for seed production)*:**
Apply at the 2 to 4 leaf stage.

- Creeping red fescue
- Crested wheatgrass
- Intermediate wheatgrass
- Meadow foxtail
- Orchardgrass
- Smooth bromegrass
- Timothy

**Established grasses for forage only (NOT for seed production)*:**
Apply up to flag leaf stage.

- Bromegrass (meadow, smooth)
- Fescue (creeping red, meadow, tall)
- Kentucky bluegrass
- Meadow foxtail
- Orchardgrass
- Timothy
- Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall, western)

* *NOTE: Use only one application per year by ground. Since applications to forage grasses in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to forage grasses are at the risk of the user.***

## Cost (2005 suggested retail price):

**Target:** $13.52 per L.
**Sword:** $13.47 per L.

## Weeds and Staging:

Weeds controlled at the 2 to 3 leaf stage unless otherwise indicated:

- Annual sow-thistle
- Ball mustard
- Canada thistle (6 to 8 inches (15 to 20 cm) and actively growing)*
- Cleavers (1-2 whorls)
- Common ragweed
- Corn spurry
- Cow cockle
- Field bindweed*
- Flixweed
- Green smartweed
- Hedge bindweed*
- Hemp-nettle (less than 2 pairs of true leaves)
- Knotweed
- Kochia
- Lady's-thumb
- Lamb's-quarters
- Night-flowering catchfly
- Perennial sow-thistle*
- Prostrate pigweed
- Redroot pigweed
- Russian thistle (less than 2 inches-5 cm)
- Shepherd's-purse
- Stinkweed
- Tall mustard
- Tartary buckwheat
- Volunteer buckwheat
- Volunteer canola
- Volunteer sunflowers
- Wild buckwheat
- Wild mustard
- Wormseed mustard
- Yellow mustard

* Top Growth Control only

## Rates:

0.4 to 0.6 L per acre (10 L treats 25 to 16.7 acres).

Use the higher rate under adverse weather conditions, when weed density is high, for cleavers control, winter annual control and for suppression of Canada thistle and perennial sow-thistle.

Although diacamba + mecoprop + MCPA is registered up to the 5 leaf stage of the crop for the rates listed here, the low rate should be used when the crop is at the 5 leaf stage for optimum crop safety.

For Canada thistle, post-harvest or summerfallow application, use 0.81 L/acre (one 10 L container treats 12.4 acres).

## Application Information:

**Water Volume:**
***Ground:*** Minimum 40 L per acre.
***Aerial:*** Minimum of 12 L per acre

**Pressure:** 30 to 45 psi (200 to 300 kPa).

**Nozzles:** Flat fan with 50 mesh screens and filters.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Hot and dry or cold and wet weather prior to spraying may result in reduced weed control and increased crop injury. Do not apply within 2 weeks of a killing frost.

## Tank Mixes:

**Herbicides:**
***Spring wheat (including durum):***
Horizon plus Score adjuvant.
***Spring wheat (excluding durum):***
Everest*
***Wheat and Barley:***
Sencor or linuron for chickweed control.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

* May be tank-mixed with Sword only. A reduction in wild oat control may be observed with the tank-mix

**Note: The above mixes are those listed on the dicamba +mecoprop+MCPA labels only. To check for other possible mixes see the blue chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Activity may be reduced if rainfall occurs within 3 hours of application. Contact manufacturer for more information.

**Grazing:** Do not graze or harvest for livestock feed within 7 days of application.

**Preharvest:** Leave at least 80 days from application to harvest.

**Recropping:** No restrictions the year after application.

**Aerial Application:** Both Target & Sword may be applied by air.

**Storage:** Do not freeze.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

# Dichlorprop + 2,4-D

**Herbicide Group – 4**
*(Refer to page 27)*

## Company/Products:

United Agri Products (Turboprop 600 – PCP#16532, Turboprop PCP#27967)
Nufarm Agriculture (Estaprop – PCP#14803, Estaprop Plus PCP#27968)
IPCO (Dichlorprop-D – PCP#21717 or 27966)

## Formulation:

300 g/L of dichlorprop and 282 g/L of 2,4-D ester formulated as an emulsifiable concentrate.

Turboprop, Dichlorprop-D: Container sizes – 2 x 10 L, 115 L

Estaprop Plus: Container size – 2 x 10.6 L

## Crops and Staging:

Wheat (spring, durum) and barley - 4 leaf until prior to the emergence of the flag leaf.

Winter wheat - in spring after tillering but prior to the emergence of the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

Treat weeds when young and actively growing and before they are shielded by the crop. Additional stage restrictions are indicated.

Annual sow-thistle
Ball mustard
Bluebur
Burdock
Canada thistle*
Cocklebur
Curled dock*
Dog mustard
Flixweed
Hare's-ear mustard
Indian mustard
Kochia◊◊◊
Lady's-thumb◊◊
Lamb's-quarters
Night-flowering catchfly◊
Oak-leaved goosefoot
Perennial sow-thistle*
Ragweed
Redroot pigweed
Round-leaved mallow
Russian pigweed
Russian thistle◊◊◊
Shepherd's-purse
Smartweed◊◊
Stinkweed
Stork's-bill
Tartary buckwheat◊◊
Tumble mustard
Volunteer canola◊◊
Volunteer sunflower◊◊
Wild buckwheat◊◊
Wild mustard
Wormseed mustard
Toadflax**

* Top growth control only
** Suppression only. Treat before the majority reach 6 inches (15 cm).
◊ Spring annuals only
◊◊ Treat prior to the 4 leaf stage
◊◊◊ Treat up to 2 inches (5 cm)

## Cost (2005 suggested retail price):

**Dichlorporp-D:** $5.96 per acre
**Estaprop:** $5.93 per acre
**Turboprop:** $6.22 per acre.

## Rates:

0.71 L/acre
One 10 L container treats 14 acres
One 10.6L container treats 15 acres

## Application Information:

**Water Volume:**

*Ground:* 20 to 97 L per acre*. Use a minimum of 40 L of water per acre to reduce the risk of drift.
*Aerial:* Minimum 12 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan.

* May vary by product. Check label closely.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Applications made under dry conditions may result in reduced control. Crops under stress from adverse environmental conditions, such as excess moisture, frost or drought, may be injured. Best weed control when adequate soil moisture is present and warm temperatures prevail. Do not apply when daytime temperatures exceed 27°C.

## Tank Mixes:

**Herbicides:**

| | **Spring Wheat (including durum)** | **Barley** |
|---|---|---|
| Estaprop | Avenge | Avenge |
| Turboprop | Achieve, Avenge, Assert, Horizon, Puma$^{120}$ Super | Achieve, Avenge, Puma$^{120}$ Super |
| Dichlorprop-D (PCP# 21717 only) | Avenge | Avenge |

Note: Always refer to the label or the Guide section of the tank mix partner for additional restrictions on staging and varieties.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on dichlorprop + 2,4-D labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing**

***Estaprop, Turboprop (PCP#27967) and Dichloroprop-D (PCP#27966)*** - Do not graze the treated crop or harvest for hay or feed within 40 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. ***Dichlorprop-D (PCP#21717) and Turboprop 600 (PCP#16532)***- Do not graze treated crops or cut for feed in the year of treatment.

**Recropping:** No restrictions the year after application.

**Aerial Application:** May be applied by air. Refer to specific product labels for full details for application by air.

**Storage:** May be frozen.

**Environment:** Do not spray when winds are calm or greater than 8 km/hr. Apply when downwind of sensitive non-target plants, open water and wetland areas. No specific distance is indicated for an upwind buffer zone from these habitats. Contact Manufacturer for details.

## Tank Cleaning:

Manufacturers of this product warn that even after thorough cleaning, the use of a sprayer that has come in contact with this product may cause damage to susceptible crops.

Do not use spray equipment to apply other pesticides to crops sensitive to these products. To clean sprayer, rinse all parts several times with water, then fill sprayer with a water/ammonia solution (1 L of a 3% household ammonia solution per 100 L of water) and let stand for 24 hours. Rinse several times after with clean water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

## Hazard Rating:

◈ Warning Poison

# Dual II Magnum

**Herbicide Group – 15**
*(Refer to page 27)*

## Company:

Syngenta (PCP#25729)

## Formulation:

915 g/L metolachlor formulated as an emulsifiable concentrate. Container size - 12 L.

## Crops and Staging:

Preplant incorporated. In areas with good rainfall or under irrigation, Dual II Magnum may be applied as a pre-emergence surface treatment. When Dual II Magnum is applied to the soil surface, after planting but prior to emergence, at least 0.5 inches of water (1.25 cm) is required within 10 days of application for proper activity.

Corn (field, sweet, silage),
Dry beans (white, kidney and pinto)*
Potatoes
Soybeans
Sweet white lupins

* Beans should be planted at least 4 cm deep to avoid crop injury.

## Weeds and Staging:

Apply prior to weed emergence.

American nightshade
Barnyard grass
Eastern black nightshade
Fall panicum
Giant foxtail
Green foxtail
Hairy crabgrass
Old witch grass
Redroot pigweed*
Smooth crabgrass
Yellow foxtail
Yellow nutsedge**

* Suppression only.
** Preplant incorporated treatment only.

## Cost (2005 suggested retail price):

$18.60 to $26.25 per acre.

## Rates:

0.5 to 0.7 L/acre (12 L treats 24 to 17 acres). Use higher rates on heavy textured soils or when high populations of weeds are expected. Do not apply to soils with less than 1% or more than 10% organic matter. Make only one application per season.

## Application Information:

**Water Volume:** A minimum of 60 L per acre.

**Pressure:** 30 to 45 psi (200 to 300 kPa).

**Nozzles:** Use flat fan nozzles, 50 mesh screens.

## Incorporation:

Apply to a firm seed bed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 6 km/hr (4 mph). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 10 km/hr (6 mph). Incorporation equipment should include rolling or western harrows.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

A moderate rainfall or equivalent irrigation is required within 10 days to activate pre-emergent surface treatments. If rain does not occur, a shallow cultivation or use of a rotary hoe is necessary. Drought conditions that persist after any application may reduce annual grass control. On sandy soils, heavy rainfall following application may cause leaching of Dual II Magnum, resulting in reduced weed control.

## Tank Mixes:

**Herbicides:**

***In Corn:*** Aatrex in both PPI and pre-emergent applications.
***In Soybeans:*** Sencor, glyphosate, and Pursuit in both PPI and pre-emergent applications.

**Fertilizers:** May be applied with liquid fertilizer. May be impregnated onto dry bulk fertilizers (except nitrate fertilizers, superphosphate fertilizers or limestone).

**Insecticides:** None registered.

**Note: The above mixes are those listed on the Dual II Magnum label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** When PPI, 0.5 inches (1.25 cm) of rain is required after application for proper activity.

**Grazing:** Do not graze the treated immature crop or cut for hay. In corn, immature means before ear emergence.

**Recropping:** In the year of treatment, seed only corn, soybeans, white beans, potatoes, snap beans, lima beans, processing peas, sweet white lupins, or (a minimum of 4.5 months after application) winter cereals. If Dual II Magnum has been applied in a tank mix with another product, consult those products' labels for additional recropping restrictions.

**Aerial Application:** Do not apply by air.

**Storage:** May be frozen.

**Environment:** Leave a buffer zone of 29 meters between last spray swath and the edge of important wildlife habitats such as wetlands, sloughs and water bodies.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Warning Eye Irritant
Potential Skin Sensitizer

# DyVel

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

BASF Canada (PCP#16545)

## Formulation:

84 g/L of dicamba and 336 g/L of MCPA K+ formulated as a solution.

Container size - 2 x 10 L jugs, 55 L, 110 L.

## Crops and Staging:

Spring wheat (including durum), barley or oats - 2 to 5 leaf stage.

Winter wheat - apply in spring when crop is 6 to 10 inches (15 to 25 cm) tall but before shot blade stage.

*Note: Crop damage can occur if applications are made at other than the recommended crop stage.*

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds controlled in the 2 to 4 leaf stage unless otherwise stated:**

Ball mustard
Burdock
Cleavers (suppression only)
Cocklebur
Common ragweed
Corn spurry (2 to 3 leaf)
Lamb's-quarters
Prostrate pigweed
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse
Cow cockle (2 to 3 leaf)
False ragweed
Flixweed
Giant ragweed
Green smartweed
Hare's-ear mustard
Hemp-nettle (2 to 3 leaf)
Indian mustard
Kochia
Lady's-thumb
Stinkweed
Tartary buckwheat
Tumble mustard
Wild buckwheat
Wild mustard
Wormseed mustard
Wild radish
Volunteer canola (2 to 4 leaf)
Volunteer sunflowers

**Top growth control:**
Canada thistle
Perennial sow-thistle

## Cost (2005 suggested retail price):

$5.82 per acre.

## Rate:

0.5 L/acre (one 10 L jug treats 20 acres).

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 to 45 psi (275 to 310 kPa). To reduce the risk of drift damage to sensitive non-target crops, 20 to 30 psi (150 to 200 kPa) and higher water volumes are recommended.

**Nozzles:** Flat fan. Select nozzles that produce a low number of fine droplets to reduce the risk of drift.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

For best weed control, apply when temperature is between 10 and 25°C. Do not treat crops under stress from excessive moisture or drought. To avoid crop injury, do not apply when temperature is expected to exceed 30°C, or when there is a risk of a severe drop in overnight temperature.

## Tank Mixes:

**Herbicides:**

***In Spring wheat:***

Horizon (93 mL/acre) (wild oat control only), plus Score adjuvant

Horizon (117 mL/acre) (wild oat, green and yellow foxtail), plus Score adjuvant.

Everest – 17.4 g/acre plus non-ionic surfactant

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the DyVel label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze treated crop or cut for hay within 30 days of application.

**Preharvest Interval:** Leave 60 days between application and harvest.

**Recropping:** No restrictions the year after treatment.

**Aerial Application:** May be applied by air. Use a minimum of 8 L/acre water volume.

**Storage:** May be frozen.

**Environment:** Avoid drift onto sensitive plants. Leave a distance of 15 m between the outside edge of the sprayed area and sources of domestic, irrigation or natural water or wetland areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

☠ Caution Poison

# DyVel DSp

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

BASF Canada (PCP#27856)

## Formulation:

110 g/L dicamba, 295 g/L 2,4-D amine and 80 g/L mecoprop-p formulated as a solution.

Container size - 2 x 10 L jugs, 55 L, 110 L.

## Crops, Rates and Staging:

| CROP | STAGE | RATE | |
|---|---|---|---|
| | | (L/ACRE) | ACRES PER 10L JUG |
| Spring wheat (including durum) | 3 to 5 leaf | 0.34 to 0.45 | 29 to 22 |
| Barley | 2 to 3 leaf | 0.34 | 29 |
| Winter wheat | before crop is 12 inches (30 cm) tall in spring | 0.34 to 0.45 | 29 to 22 |
| Corn (field and sweet) | before corn reaches 6 inches (15 cm) in height with the top leaf extended | 0.34 to 0.45 | 29 to 22 |
| Native range and permanent grass pasture* | Established | 1.3 | 7.7 |
| Fall stubble, summerfallow | Stage according to weed | 0.45 to 0.71 | 22 to 14 |

* Legumes will be severely injured by this application.

Applications outside the recommended stage may result in crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**The low registered rate for each crop will control the following weeds at the 2 to 3 leaf stage unless otherwise indicated:**

Annual smartweed (including lady's-thumb)
Annual sow-thistle
Cocklebur
Common ragweed
Corn spurry
Hedge bindweed
Knotweed
Kochia
Lamb's-quarters
Mustards (wild, ball, tall, wormseed, yellow)
Pigweed (prostrate, redroot)
Russian thistle
Stinkweed*
Volunteer canola (2 to 4 leaf, prior to bolting)
Volunteer tame buckwheat
Wild buckwheat

**Use the high registered rate for each crop to control the following weeds:**

Canada thistle (top growth only)***
Cleavers (1 to 2 whorls)**
Cow cockle
Field bindweed†
Flixweed*
Jerusalem artichoke
Round-leaved mallow**
Shepherd's-purse
Tartary buckwheat

† Apply when actively flowering.
* Rosette stage in winter wheat.
** Suppression only.
*** Canada thistle should be treated when 6 to 8 inches (15 to 20 cm) of new growth is present in Fall Stubble and in the early bud stage in Summerfallow.

**Rates for Native Range and Pasture will control:**

Alder
Bull thistle
Chicory
Goat's-beard
Poison ivy
Ragwort
Sheep laurel
White cockle

The high rate for each crop should be used for all weeds under adverse growing conditions, when weeds are at an advanced stage of growth or when weed densities are high. Guidelines are not provided for weed densities under light or heavy infestations. When in doubt as to the infestation level, use the high rate or contact the manufacturer.

*NOTE: It is possible that poisonous plants such as ragworts, hemlocks and death camas could be more palatable to livestock after treatment with DyVel DSp. Suitable precautions should be taken to avoid livestock access when such plants are present.*

## Cost (2005 suggested retail price):

$4.80 to $6.33 per acre in crop applications.
$6.33 to $9.94 per acre for fall stubble and summer fallow.
$18.08 per acre for pasture

## Application Information:

**Water Volume:**
*Cereals:* Minimum 40 L per acre.
*Corn:* 81 to 142 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan.

## How it Works:

**Refer to Table 2 on page 29.**

## Effects of Growing Conditions:

**Crops under stress from excess moisture, drought or disease may suffer a setback when this herbicide is applied. Do not apply when temperature exceeds 27°C or when relative humidity is high. Stubble treatments for thistle control in fall should be made at least 2 weeks prior to killing frost.**

Do not apply DyVel DSp at wind speed greater than 5 mph (8 km/hr).

## Tank Mixes:

**Herbicides:**

***In corn:***

Atrazine.

***In spring wheat (NOT including durum):***

Everest (17.4 g/acre) plus non-ionic surfactant.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the DyVel DSp label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not harvest for livestock feed within 30 days of application. Do not permit lactating dairy animals to graze fields within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

**Recropping:** No restrictions the year after treatment.

**Aerial Application:** Do not apply by air.

**Storage:** May be frozen.

**Environment:** If there are sensitive plants within 400 m, apply only when there is a light breeze away from the sensitive area. Do not contaminate wetlands or water used for domestic or livestock consumption, irrigation or natural habitat.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◈ Warning Poison

# Eclipse

**Herbicide Group – 4, 9**
*(Refer to page 27)*

**This product is a prepackaged tank mix of Eclipse A (Lontrel page 150) and Eclipse B (Vantage Plus pages 123 to 132). Information listed is restricted to Crop, Weeds, Rates and Cost and other important details. For other detailed information on the component products see the product pages listed above.**

## Company:

Dow AgroSciences

## Formulation:

**Eclipse A (PCP#26633):** 360 g/L clopyralid formulated as a solution.

**Eclipse B (PCP#26634):** 360 g/L glyphosate present as an isopropylamine salt and formulated as a solution.

Container size – Each case will treat 30 acres and will consist of 3 split jugs (10 acres/jug). Each split jug will contain 1.12 L of Eclipse A and 5 L of Eclipse B.

## Crops and Staging:

Glyphosate tolerant (Roundup Ready) canola varieties only in the 2 to 6 leaf stage. Some yellowing may occur when applied at the 4 to 6 leaf stage. This effect is temporary and will not influence crop growth, maturity or yield.

## Weeds and Staging:

No staging is specified on the label.

**Annual grasses:**
Green foxtail
Wild oat
Volunteer barley
Volunteer wheat

**Annual broadleaf weeds:**
Chickweed
Cleavers
Corn spurry
Cow cockle
Hemp nettle
Kochia
Lady's-thumb
Lamb's-quarters
Night-flowering catchfly
Redroot pigweed
Russian thistle
Shepherd's-purse
Smartweed
Stinkweed
Wild buckwheat
Wild mustard
Volunteer canola*
Wild tomato

**Perennial weeds (season long control):**
Canada thistle
Dandelion less than 15 cm diameter**
Dandelion greater than 15 cm diameter***
Perennial sow-thistle**
Quackgrass

* Not including glyphosate tolerant (Roundup Ready) varieties
** Top growth only
*** Suppression only.

## Cost (2005 suggested retail price):

$14.90 per acre.

## Rates:

Apply Eclipse A at 0.112 L/acre and Eclipse B at 0.5 L/acre or 10 acres/jug (30 acres/case).

To prepare spray solution, add Eclipse A to the spray tank. Once it is half filled with water, add Eclipse B as the remaining water is added to the tank.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa)

**Nozzles:** Use nozzles that give even coverage without producing small droplets that are prone to drifting. Do not use with galvanized sprayer tanks since explosive hydrogen gas can be produced.

## Restrictions:

**Recropping:** Wheat, oats, barley, rye (not underseeded to legumes such as alfalfa and clover), forage grasses, flax, canola, mustard and field peas*can be grown the year after application. Apply manure bedded with straw from treated crops only to the crops listed above excluding field peas.

**Do not seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.*

**Aerial application:** Do not apply by air.

# Edge

**Herbicide Group – 3**
*(Refer to page 27)*

## Company:

Dow AgroSciences (PCP#20980)

## Formulation:

Edge Granular - 5% ethalfluralin formulated as a granular.
Container size - 25 kg or 544 kg.

## Crops and Staging:

Edge can be applied prior to seeding the following crops:

Seedling alfalfa (seed production only)
Canola
Caraway
Coriander
Dry beans (white or kidney)
Fababeans
Lentils (fall application only)†
Mustard (yellow only)
Peas
Safflower
Soybeans
Sunflowers

## Weeds and Staging:

For pre-emergent control of the following weeds:

**Grasses:**
Barnyard grass
Crabgrass
Foxtail (Green & Yellow)
Volunteer barley*
Volunteer spring wheat
Wild oat*

**Broadleaf Weeds:**
Cleavers*
Chickweed
Cow cockle
Corn spurry
Hemp-nettle*
Kochia
Lady's-thumb*
Lamb's-quarters
Nightshade*
Prostrate pigweed
Purslane
Redroot pigweed
Russian thistle*
Wild buckwheat

* Suppression only.

## Rates:

| TIME OF APPLICATION | RATE (KG/ACRE) | | | | |
|---|---|---|---|---|---|
| | LIGHT TEXTURED SOILS | | MEDIUM TO HEAVY TEXTURED SOILS | | |
| | 2-6% Organic Matter/Dark Brown-Black | 6-15% Organic Matter Deep Black | 2-4% Organic Matter Dark Brown | 4-6% Organic Matter Black | 6-15% Organic Matter Deep Black |
| Spring | 6.9 | 8.9 | 6.9 | 8.9 | 8.9 - 11.3 |
| Fall * | 8.9 | 11.3 | 8.9 | 11.3 | 11.3 |

* To conserve crop residue, one incorporation may be completed in the fall and the second incorporation completed in the spring prior to planting.

Do not apply Edge to peat soils, soils containing less than 2 percent organic matter or soils containing greater than 15 percent organic matter. Application to eroded knolls or grey-wooded soils with highly variable texture or organic matter may result in reduced crop stand, delayed development or reduced yields in either the treated or rotational crop. To reduce the possibility of injury to the treated crop, use good quality certified seed. Seed shallow into a warm, moist, firm seedbed using recommended agronomic practices that will promote rapid and even crop germination and emergence.

**† Special instructions for lentils:**
Edge is registered for use on lentils for fall application only. One incorporation must be completed in the fall. Seeding depth is critical - do not seed more than 1.5 inches (4 cm) deep. Avoid loose seedbeds and planting into cold soils.

## Cost (2005 suggested retail prices):

$15.69 to $26.18 per acre.

## Application Information:

**Equipment:** Apply Edge Granular using a calibrated granular applicator.

**Incorporation:** Two incorporations are required at right angles for thorough mixing. The first incorporation must be completed within 24 hours of application. When using the granular formulation, delay the second incorporation for at least three days after the first. If applying Edge granular in the fall, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve trash; however, both incorporations must be done to the same depth.

Incorporate with a tandem disc, discer or field cultivator (Vibrashank type). A cultivator should have 3 to 4 rows of sweeps spaced 8 inches apart and staggered so that no soil is left unturned. Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Crops stressed by cold weather, excessive moisture or drought may be injured by Edge. Dry soil conditions between application and emergence may result in decreased weed control.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** No effect once incorporated.

**Grazing:** Do not graze or cut treated crops for livestock feed prior to crop maturity.

**Recropping: Do NOT grow** - sugar beets, oats, and small-seeded annual grasses such as timothy, canaryseed and creeping red fescue in rotation following a crop treated with Edge. Do not seed wheat as a rotational crop onto land that has been treated with trifluralin and/or ethalfluralin at oilseed/special crop/barley rates for 2 consecutive crop years Thinning of crop may occur in areas that have received abnormally low amounts of precipitation or in crops that are emerging slowly.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool, dry place. Edge Granular may be frozen. Do not expose to prolonged sunlight or heat.

**Environment:** Toxic to fish and other aquatic organisms. Do not contaminate water bodies or wetland areas.

## Tank Cleaning:

Refer to page 14.

# Elite

### Herbicide Group – 1,4,6

*(Refer to page 27)*

**This product is a prepackaged tank mix of Mextrol (Page 81) and Poast Ultra (Page 166). Information listed is restricted to Crop, Weeds, Rates and Cost. For other detailed information on the component products see the product pages listed above.**

## Company:

Nufarm Agriculture

## Formulation:

The Elite package has 2 components:

**Mextrol 400 (PCP#25342):** 200g/L bromoxynil and 200 g/L MCPA formulated as an emulsifiable concentrate.

**Poast Ultra (PCP#24835):** 450g/L of sethoxydim formulated as an emulsifiable concentrate.

**Merge (PCP#24702):** adjuvant.

Container size:
Mextrol – 11.36 L; Poast Ultra – 3.65 L; Merge – 8.1 L

One case treats 20 acres

## Crops and Staging:

Flax (including Solin varieties) - 2 to 4 inches (5-10 cm)

## Weeds and Staging:

**Grass weeds: (1 to 6 leaf, unless otherwise stated)**

Barnyard grass
Fall panicum
Green & yellow foxtail
Quackgrass (2 to 5 leaf stage)*
Volunteer cereals
Wild oats
Witchgrass

**Broadleaf weeds up to 4 leaf stage**

American nightshade
Bluebur
Ball mustard
Canada thistle*
Cocklebur
Cow cockle
Flixweed
Green smartweed
Kochia**
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Perennial sow-thistle*
Russian thistle**
Scentless chamomile***
Shepherd's-purse
Volunteer canola
Volunteer sunflower

**Broadleaf weeds up to 8 leaf stage:**

Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tame buckwheat
Tartary buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

* Suppression only
** Control before plants are 2 inches high
*** Spring seedlings only

## Cost (2005 suggested retail price):

$21.65 per acre.

## Rate:

Mextrol - 0.57 L per acre
Poast Ultra - 0.19 L per acre
Merge - 0.4 L per acre
One case treats 20 acres

## Application Information:

**Water Volume:** 20 to 40 L per acre.

**Pressure:** 40 psi (275 kPa)

**Nozzles:** Flat fan nozzles

# Eptam 8-E

**Herbicide Group – 8**
*(Refer to page 27)*

## Company:

Gowan Canada (PCP#11284)

## Formulation:

800 g/L of EPTC formulated as an emulsifiable concentrate. Container size - 10 L.

## Caution:

The level of weed control may be reduced where Eptam 8-E is used on soils that have been treated with Eradicane or Eptam 8-E the previous growing season. It is expected that the reduction in control will be greater where Eradicane or Eptam 8-E have been used repeatedly for 2 or more years.

## Crops, Rates and Staging:

Eptam is applied as a preplant incorporated treatment prior to seeding the following crops:

| CROP | RATE (L/ACRE) | ACRES TREATED PER 10 L CONTAINER |
|---|---|---|
| Dry and snap-beans | 1.72 - 2.23 | 5.8 - 4.5 |
| Alfalfa,<br>Bird's-foot trefoil<br>Cicer milkvetch**<br>Sweet clover**<br>Sunflowers* | 1.72 | 5.8 |
| Potatoes | 1.72 - 3.44 | 5.8 - 2.9 |
| Flax* | 1.42 - 1.72 | 7.0 - 5.8 |

* May also be applied in late fall prior to freeze-up
** Seed production only

**NOTE: The use of Eptam 8-E on flax is not recommended in Saskatchewan because of the risk of crop injury.**

Where a rate range appears, use the lower rate on light textured soils and the higher rate on heavy textured soils. Do not use on soils with less than 3 percent organic matter or more than 15 percent organic matter.

## Weeds and Staging:

Must be applied prior to the emergence of the following weeds. Emerged weeds will not be controlled.

Barnyard grass
Chickweed*
Corn spurry*
Green foxtail
Hairy nightshade*
Henbit *
Lamb's-quarters*
Nettleleaf goosefoot*
Purslane*
Pigweed (prostrate, redroot, tumble)*
Quackgrass (suppression)**
Volunteer cereals (wheat, barley, oats)
Wild oat
Yellow foxtail
Yellow nutsedge**

* Will be controlled only if treatment is made when conditions are favourable for germination and growth.

** Roots of perennial weeds must be thoroughly chopped prior to application.

## Cost (2005 suggested retail price):

$21.76 to $43.52 per acre

## Application Information:

**Carrier Volume:** Minimum of 40 L per acre of water or liquid fertilizer (see label for liquid fertilizer compatibility).

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Equipment and Nozzles:** Since Eptam 8-E is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil).

May also be applied to cleanly cultivated soil for potatoes, by metering into the irrigation water to achieve the recommended rate per acre ("herbigation" or "chemigation"). See label for detailed instructions.

**Incorporation:** All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application preferably during the spraying operation as Eptam 8-E is volatile. Set disc and cultivator implements to cut to a depth of 4 to 6 inches (10 to 15 cm). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device that extends beyond the width of the implement. Speeds in excess of 5 mph (8 km/h) will result in excessive pulverization and trash destruction leaving the field susceptible to erosion. The maximum recommended tillage depth is 4 inches (10 cm).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Crop injury can occur if stressful environmental conditions (cold, wet soils, drought or excessive heat) prevail after seeding. To minimize crop injury, delay seeding 10 days if these conditions prevail at the time of application, or select an alternative product. Very cold or dry soil conditions during weed emergence will reduce control.

## Tank Mixes:

**Herbicides:**

***Dry beans (white and red kidney only):*** Liquid formulations of Treflan and Rival.

**Fertilizers:** May be mixed with liquid fertilizer.

Compatibility test should be conducted according to instructions on the herbicide label.

Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with Eptam 8-E. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1/2 inch (1.5 cm) depth. The first incorporation must be done immediately after application.

**Insecticides:** Do not tank mix with insecticides.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Eptam label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No effect once incorporated. Do not apply prior to pre-irrigation.

**Grazing:** Do not graze or feed treated crops to livestock in the year of application.

**Recropping:** Will not injure crops the year after spring application.

**Aerial Application:** Do not apply by air.

**Storage:** May be frozen.

**Environment:** Do not apply within 15 m of fish bearing waters or wildlife habitat.

**Soil Type:** Do not use on soils with less than 3 percent organic matter as crop injury will result.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

▽ Caution Poison

# Eradicane 8-E

**Herbicide Group – 8**
*(Refer to page 27)*

## Company:

Gowan Canada (PCP#12239)

## Formulation:

800 g/L of EPTC (plus safener) formulated as an emulsifiable concentrate.

Container size - 10 L.

## Caution:

The level of weed control may be reduced where Eradicane 8-E is used on soils that have been treated with Eradicane 8-E or Eptam 8-E the previous growing season. It is expected that the reduction in control will be greater where Eradicane 8-E or Eptam 8-E has been used repeatedly for 2 or more years.

## Crops and Staging:

Corn (field, sweet* and silage). Eradicane is applied as a preplant incorporated treatment.

* Maximum 2.23 L/acre rate.

## Weeds and Staging:

Must be applied prior to the emergence of the following weeds. Emerged weeds will not be controlled.

Barnyard grass
Chickweed
Corn spurry
Green and yellow foxtail
Hairy nightshade
Henbit
Lamb's-quarters
Pigweed (prostrate, redroot, tumble)
Purslane
Quackgrass (suppression)
Volunteer cereals (wheat, barley, oats)
Wild oats
Yellow nutsedge

## Rates:

| USE | RATE (L/ACRE) | ACRES TREATED PER 10 L CONTAINER |
|---|---|---|
| Annual weed control in light textured soils | 1.72 | 5.8 |
| Annual weed control in heavy textured soils | 2.23 | 4.5 |
| Quackgrass suppression | 3.44 | 2.9 |

## Cost (2005 suggested retail price):

$24.80 to $49.60 per acre.

## Application Information:

**Carrier Volume:** Minimum of 40 L per acre of water or liquid fertilizer (See label for liquid fertilizer compatibility).

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Equipment and Nozzles:** Since Eradicane 8-E is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil).

## Incorporation:

All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application, preferably during the spraying operation, as Eradicane 8-E is volatile. Set disc and cultivator implements to cut to a depth of 4 to 6 inches (10 to 15 cm). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device that extends beyond the width of the implement.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Poor weed control may result if soils are wet during incorporation.

Crop injury may result if soil is cold and wet during germination and emergence. Hot, dry conditions during germination and early crop growth may also lead to crop injury.

## Tank Mixes:

**Herbicides:** Atrazine.

**Fertilizers:** Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with Eradicane 8-E. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1/2 inch (1.5 cm) depth. The first incorporation must be done immediately after application.

May also be mixed with liquid fertilizer. Conduct a compatibility test prior to mixing in tank. See label for instructions on conducting a compatibility test.

**Insecticides:** Do not tank mix with insecticides.

**Note: The above mixes are those listed on the Eradicane 8-E label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No effect once incorporated.

**Grazing:** Do not graze treated crops or cut for feed prior to ear emergence.

**Recropping:** Will not injure crops the year after spring application.

**Aerial Application:** No labelled restrictions, however, since this product must be incorporated within seconds of application, aerial applications are impractical.

**Storage:** May be frozen.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

# Escort

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

E. I. duPont Canada (PCP#23005)

## Formulation:

60% metsulfuron methyl formulated as a dry flowable. Container size - 0.25 kg.

## Crops and Staging:

Pasture, rough turf, and rangeland.

No stage restrictions.

## Weeds, Rates and Staging:

For seedling weeds apply to young plants up to 4 inches (10 cm) tall or wide. For established non-woody plants (biennial or perennial) apply up to the early bud stage. For western snowberry, wild rose and other woody species, apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

| Rate | Weeds Controlled | |
|---|---|---|
| 8 g/acre | Canada thistle*<br>Dandelion*<br>Russian thistle<br>Sow-thistle* | Common tansy<br>Kochia<br>Scentless chamomile<br>Sweet Clover |
| 10 g/acre | Above weeds plus:<br>Canada thistle*<br>Sow-thistle* | Dandelion*<br>Western snowberry |
| 12 g/acre | Above weeds plus:<br>Wild rose<br>Canada thistle* | Dandelion<br>Sow-thistle* |
| 40 g/acre** | Balsam poplar | Willow |
| 60 g/acre** | Cherry | Trembling Aspen |

At all rates add Agral 90, Agsurf, or Citowett at 0.2 L per 100 L of spray solution.

* Suppression only.

** Rangeland only. See label for detailed application instructions.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

$14.00 to $20.83 per acre for weeds and up to $103 per acre for woody species.

## Application Information

**Water Volume:** 40 to 91 L per acre for weedy growth and up to 809 L per acre applied to the point of run-off for woody species. See the label for details.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Do not apply during periods of intense rainfall or to soil saturated with water. Warm, moist conditions following treatment enhance the activity of Escort, while cold, dry conditions may reduce or delay activity. Brush hardened off by cold weather and drought stress may not be controlled.

## Tank Mixes:

**Herbicides:** 2,4-D amine or ester at 0.79 L/acre (500 g/L formulations) plus surfactant.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** May be grazed on the day of treatment.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool, dry place. May be frozen.

**Environment:** Leave a 15 m buffer from the down-wind edge of the spray boom to sensitive areas for rates up to 12 g/acre and 45 m for rates up to 60 g/acre

## Tank Cleaning:

Escort can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Escort should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with water/ammonia solution (1 L of 3% household ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned with water/ammonia solution after applying this product. Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for more information on tank cleaning.

## Hazard Rating:

Caution Eye Irritant

# Everest

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

Arysta LifeScience Canada (PCP#26448)

## Formulation:

66% flucarbazone-sodium formulated as a water dispersible granule.

Container size - 4 x 174 g water-soluble packets.

## Crops and Staging:

Spring wheat (including durum) with 1 leaf to a maximum of 4 main stem leaves plus 2 tillers (6 total leaves).

Everest MUST be tank mixed with a broadleaf partner for crop safety. Tank mix options are listed in the tank mix section.

*Note: Several of the tank mix partners have more limiting staging than Everest. When tank mixing use the most restrictive application state or injury may result.*

## Weeds, Rates and Staging:

| WEED | STAGE | RATE |
|---|---|---|
| Wild oat, volunteer oat | 1 to 6 leaf, maximum of 4 main stem leaves and 2 tillers | 17.4 g/acre |
| Green foxtail | 1 to 6 leaf, maximum of 4 main stem leaves and 2 tillers | 8.7 g/acre |
| Green smartweed, redroot pigweed, shepherd's purse, volunteer canola*, wild mustard | 2 to 6 leaf stage | 11.5 g/acre |
| Stinkweed | 2 to 9 leaf stage | 11.5 g/acre |

Add non-ionic surfactant (Agral 90, Agsurf, Surf 92, Super Spreader, LI700) at 0.25 L per 100 L of spray solution.

* Will not control imidazolinone tolerant (Clearfield) canola volunteers.

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

$8.64 to $17.28 per acre, not including adjuvant and required tank mix partner.

## Application Information:

**Water Volume:**
*Spring wheat:* 20 to 40 L per acre.
Note: Only Agral 90 and Ag-Surf may be used at the 20 L per acre water rate.
*Durum wheat and reduced rate for green foxtail control:* 40 L per acre.

**Pressure:** 30 to 50 psi (200 to 345 kPa)

**Nozzles:** Flat Fan nozzles at 80° or 110°. Use of flood-jet or controlled droplet application equipment is not recommended.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or water-logged soil, drought, extreme temperatures, low fertility or visible disease symptoms at application. Adopting practices to increase crop vigor will improve crop tolerance.

## Tank Mixes:

**Herbicides:**

Note: All mixes must be applied with a registered surfactant unless otherwise indicated. Only one registered surfactant is required.

***In spring wheat (including durum):***
2,4-D Amine or Ester at recommended rates up to 0.34 L/acre (500 g/L formulation)◇■
Frontline (40 acres per case)*
Spectrum (20 acres per case)*

***In spring wheat (NOT including durum):***
2,4-D Amine or Ester at recommended rates up to 0.45 L/acre (500 g/L formulation)◇ ■
Ally at 2 to 3 g/acre + 2,4-D amine or ester■ up to rates recommended above*◇
Attain (label rate)*◇■
Buctril M (0.4 L/acre)
Curtail M (0.6 to 0.8 L/acre)*◇
•DyVel (0.5 L/acre)*◇
•DyVel DS (0.34 L/acre)*◇■
Estaprop/Dichlorprop D (0.71 L/acre)■
Express Pack (label rate)*■
Frontline 2,4-D (label rate)* ■◇
MCPA Amine or Ester at recommended rates up to 0.45 L/acre (500 g/L formulation)*
Pardner (0.4 L/acre)*
Prestige (labeled rate)*◇
Refine Extra (8 g/acre) + 2,4-D (ester* or amine)■ at rates on this page.
•Target (0.4 to 0.6 L/acre)*◇
Thumper (0.4 L/acre)■
Unity (40 acres per case)*◇

* Registered for use with wild oat rate of Everest and with Agral 90 and Agsurf surfactants only.
◇ Apply in 40 L/acre of water only.
• Wild oat control may be reduced with this mix.
■ Mixes containing 2,4-D provide improved crop safety.

**Fertilizers:** Do not use liquid fertilizer or products that contain boron or free chlorine with this product or water-soluble bags will become insoluble and potentially plug sprayers.

**Insecticides:** None

**Note: The above mixes are those listed on the Everest label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Rainfall within 1 hour of application may reduce control.

**Grazing:** Do not graze treated fields. Mature grain or straw may be fed to livestock.

**Preharvest:** Leave at least 80 days from application to harvest.

**Recropping Interval:** Follow the chart below:

| Soil Zones and Rotational Crops | | | |
|---|---|---|---|
| **Grey-Wooded** | **Black** | **Dark Brown** | **Brown** |
| Spring Wheat<br>Barley<br>Canola (all varieties)<br>Field Peas* | Spring Wheat<br>Barley<br>Canola (all varieties)<br>Durum Wheat<br>Field Peas*<br>Flax<br>Field Bean | Spring Wheat<br>Barley<br>Canola (all varieties)<br>Durum Wheat<br>Field Peas*<br>Flax | Spring Wheat |

* Field peas may be grown the year following Everest application in fields where precipitation has been equal to or above the 10 year average during the growing season, and where organic matter content is above 4%, and pH is below 7.5. The company suggests a minimum of 100 mm (4 inches) of rain is needed in the 60 days following application for adequate breakdown to take place.

*NOTE: Other rotational crops may also be affected if rainfall is less than the 10 year average for the area. Soils in the grey wooded, black and dark brown soil zones with a combination of low organic matter (less than 2%), light textured soils or high pH (greater than 7.5) (i.e. eroded knolls, sandy soils) may result in delayed growth and development in rotational crops.*

**Aerial Application:** Do not apply by air.

**Storage:** Store in closed original container in a cool, dry area away from fertilizers, food or feed. Handle frozen solupaks with care since they may be fragile at low temperatures.

**Environment:** Leave at least 20 m from the downwind edge of the spray swath to sensitive plants like shelterbelts and woodlots and at least 35 m to well heads, sloughs, dugouts, ponds, marshes, ditches, streams, lakes, etc. Avoid drift onto sensitive crops like canola and tame oat. Do not mix or load within 10 m of wellheads, sloughs, dugouts, ponds, marshes, ditches, streams, lakes, etc.

## Tank Cleaning:

Everest residues in the spray tank can cause severe injury to sensitive crops at very low concentrations. Sprayers should be cleaned out immediately before using another product.

Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.
2. Fill the tank with ammonia/water solution (1 L of 3% household ammonia per 100L of water) and flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.

3. Remove all nozzles, screens and filters and clean in a separate container using an ammonia/water solution as above.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water. And wash any residue from the outside of the tank.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk. For additional information on tank cleaning see page 14.

## Hazard Rating:

Keep out of reach of children

# Express Pack

**Herbicide Group – 2, 4**
*(Refer to page 27)*

## Company:

E. I. duPont Canada

## Formulation:

The Express Pack package contains 2 containers:

**Express (PCP#22335):** 75% tribenuron methyl, formulated as a dry flowable. Container size - 160 grams.

**2,4-D herbicide (PCP#23192):** 660 g/L 2,4-D LV ester, formulated as an emulsifiable concentrate. Container size - 10 L.

## Crops and Staging:

**Express Pack:** Wheat (spring and durum), barley - 3 leaf up to emergence of the flag leaf.

Summerfallow.

## Weeds: Rates and Staging,

**Wheat (spring and durum), barley and summerfallow.**

***Express Pack case treats 40 acres. Apply when weeds are up to 4 inches (10 cm) tall or across, unless otherwise indicated:***

Annual sunflower
Ball mustard
Canada thistle*
Cow cockle
Flixweed◊◊
Hare's-ear mustard
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse◊◊
Stinkweed◊◊
Sweet clover
Indian mustard
Kochia◊◊◊
Lamb's-quarters
Narrow-leaved hawk's beard◊◊
Prickly lettuce
Thyme-leaved spurge
Tumble mustard
Wild mustard
Wild radish
Wormseed mustard
Wild buckwheat**◊

* Top growth control
** Suppression only
◊ 1 to 3 leaf stage only
◊◊ Fall rosettes and spring seedlings
◊◊◊ 2 to 10 leaf stage, if SU resistant, use the Banvel II tank mix

Express may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

**Express Pack:** $4.84 per acre.

## Application Information:

**Water Volume:** Minimum 22 L per acre.
**Pressure:** Not listed on label. Use appropriate pressure for nozzle.

**Nozzles:** Flat fan nozzles with 50 mesh (or coarser) line strainers and screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Do not apply to wheat, durum or barley that is stressed by severe weather conditions (frost, drought or water saturated soil, extreme heat), as crop injury may result. Under certain conditions (such as heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures), lightening in crop colour and reduction in crop height may occur.

## Tank Mixes:

**Herbicides:**

***In spring wheat (including durum) and barley:***

Express Pack + Assert (0.53 to 0.65 L/acre).
Express Pack + Puma$^{120}$ Super (0.155 L/acre - green foxtail rate only)

***In spring wheat (excluding durum) and barley:***

Express Pack + Banvel II ( 0.154 L/acre)

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Express Pack label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check product labels for directions.

General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours will reduce control.

**Grazing:** Do not graze or feed to livestock within 7 days of application. Withdraw meat animals from treated fields at least 3 days prior to slaughter.

**Preharvest:** Do not harvest forage or cut for hay within 30 days of application.

**Recropping:** No restrictions the year after treatment. Canola, flax, lentils and alfalfa may be planted 2 months after an application of Express Pack.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool, dry place. May be frozen.

**Environment:** Leave a 15 meter buffer zone between the last spray swath and important wildlife habitats such as shelterbelts, wetlands sloughs, and woodlots.

## Tank Cleaning:

Express can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Express should be flushed out *immediately* after use. The manufacturer recommends that sprayers, including booms and nozzles, be flushed and emptied twice with a water-household ammonia rinse (1 L of 3% ammonia per 100 L of water) followed by a clean water rinse. All nozzles, screens and filters should be removed and cleaned with the above solution after applying this product. Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

## Hazard Rating:

◈ Warning Poison

◈ Warning Eye Irritant

Potential Skin Sensitizer

# Express TNG

**Herbicide Group – 2 (mixed with 4 or 9)**
*(Refer to page 27)*

## Company:

E. I. duPont Canada

## Formulation:

**Express TNG (PCP#27532):** 75% tribenuron methyl, formulated as a dry flowable. Container size – 4 x 80 g water soluble packets.

Express TNG is purchased separately but must be used in a mix with either 2,4-D ester or glyphosate.

## Crops and Staging:

**Express TNG + glyphosate:** One day prior to seeding barley and spring wheat (including durum) and summerfallow.

**Express TNG + 2,4-D ester:** Summerfallow

## Weeds: Rates and Staging,

**Pre-seed wheat (including durum) and barley◇◇◇, summerfallow◇.**

***Express TNG 4 g/acre (one 320 g package package of Express TNG treats 80 acres) plus Roundup Original or Transorb at 0.3 L/acre plus Agral 90 at 350 mL per 100 L of solution:***

Weeds controlled by Roundup at this rate plus:

Kochia (all biotypes)
Lamb's quarters
Narrow-leaved hawk's-beard**
Redroot pigweed**
Russian thistle**
Volunteer canola (including glyphosate tolerant varieties)

***Express TNG 4 g/acre (one 320 g package package of Express TNG treats 80 acres) plus Roundup Original or Transorb at 0.4 L/acre plus Agral 90 at 350 mL per 100 L of solution:***

Weeds controlled by Roundup at this rate plus:

Dandelion*
Canada Thistle*
Volunteer canola (including glyphosate tolerant varieties)

***Express TNG 4 g/acre (one 320 g package package of Express TNG treats 80 acres plus Roundup Transorb or Touchdown iQ at 0.5 L/acre or Roundup Dry at 0.27 kg/acre or Roundup Weathermax at 0.34 L/acre:***

Weeds controlled by above glyphosate products at these rates plus:

Canada thistle rosettes**
Cow cockle
Dandelion (up to 6 inches)
Volunteer canola (including glyphosate tolerant varieties)

**Summerfallow◇**

***Express TNG 4 g/acre (one 320 g package package of Express TNG treats 80 acres plus 2,4-D ester 0.24 L/acre (LV 700 formulation):***

Weeds controlled by 2,4-D ester at 0.24 L/acre plus:

Flixweed◇◇
Stinkweed◇◇

* Top growth control
** Suppression only
◇ Allow 10 days between summerfallow treatment and tillage.
◇◇ Fall rosettes and spring seedlings.
◇◇◇ Fields treated with Express TNG and glyphosate tank mix can be seeded to wheat, durum wheat and barley 24 hours following treatment.

Express may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

**Express TNG:** $3.10 per acre plus cost of 2,4-D or glyphosate & adjuvant.

## Application Information:

**Water Volume:** 22 to 40 L per acre.

**Pressure:** Not listed on label. Use appropriate pressure for nozzle.

**Nozzles:** Flat fan nozzles with 50 mesh (or coarser) line strainers and screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance the activity of Express TNG. Weeds hardened off by environmental stress such as cold weather, drought or excessive heat may not be adequately controlled.

## Tank Mixes:

**Herbicides:**

***Prior to spring wheat (including durum) and barley:***
Must be mixed with glyphosate.
***Summrfallow:***
Must be mixed with either glyphosate or 2,4-D ester.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Express TNG label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check product labels for directions.

General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours will reduce control.

**Recropping:** There are no restrictions one year after treatment. Canola, flax, lentils and alfalfa may be planted 2 months after an application of Express TNG plus 2,4-D

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool, dry place. May be frozen.

**Environment:** Leave a 15 meter buffer zone between the last spray swath and important wildlife habitats such as shelterbelts, wetlands sloughs, and woodlots

## Tank Cleaning:

Express can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Express should be flushed out immediately after use. The manufacturer recommends that sprayers, including booms and nozzles, be flushed and emptied twice with a water-household ammonia rinse (1 L of 3% ammonia per 100 L of water) followed by a clean water rinse. All nozzles, screens and filters should be removed and cleaned with the above solution after applying this product. Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

## Hazard Rating:

Warning Eye Irritant

Potential Skin Sensitizer

# FlaxMax Ultra

### Herbicide Group – 1, 4

*(Refer to page 27)*

**This product is a prepackaged tank mix of Poast Ultra (page 166) and FlaxMax (Curtail M page 87) . Information listed is restricted to Crop, Weeds, Rates and Cost and other important details. For other detailed information on the component products, such as restrictions and the effects of growing conditions see the product pages listed above.**

## Company:

BASF Canada

## Formulation:

One case of FlaxMax Ultra contains 2 containers:

**Poast Ultra (PCP#25820):** 450 g/L of sethoxydim formulated as an emulsifiable concentrate.
Container size - 3.65 L.

**FlaxMax (PCP#25819):** 50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.
Container size – 2 x 8.1 L.

## Crops and Staging:

Flax – (NOT including Solin varieties) 2 to 6 inches (5 to 15 cm) in height. Spraying at an early stage will reduce the risk of crop injury.

## Weeds, Rates and Staging:

**Poast Ultra at 0.13 L/acre plus FlaxMax at 0.61 L/acre (27 acres per case):**

***Annual grass weeds at the 1 to 6 leaf stage:***

Barnyard grass
Crabgrass
Fall panicum
Foxtail (green and yellow)
Persian darnel
Proso millet
Volunteer corn
Witch grass

***Annual grass weeds at the 1 to 4 leaf stage:***

Volunteer barley
Volunteer wheat
Wild oat

***Annual broadleaf weeds at the 2 to 4 leaf stage:***

Flixweed
Lamb's-quarters
Shepherd's-purse
Stinkweed
Volunteer sunflower
Wild mustard

***Perennial weeds:***

Canada thistle*

**Poast Ultra at 0.19 L/acre plus FlaxMax at 0.81 L/acre (20 acres per case):**

***Annual grass weeds above at the 1 to 6 leaf stage plus:***

Volunteer barley
Volunteer wheat
Wild oat

***Annual broadleaf weeds above at the 2 to 4 leaf stage plus:***

Annual sow-thistle
Buckwheat (tartary, wild)
Common groundsel
Pigweed (redroot, Russian)
Scentless chamomile
Smartweed
Volunteer canola

***Perennial weeds:***

Canada thistle
Dandelion**
Perennial sow-thistle***

* Apply from 10 cm until early bud stage. This treatment will provide season long control of light Canada thistle infestations with some regrowth in the fall.

** Apply at the spring rosette stage.

*** Top-growth control only.

Merge adjuvant (sold separately) must be used with FlaxMax Ultra. Mix to a final ratio of 0.75 to 1.0 L of Merge per 100 L of spray solution.. When applying 40 L per acre of spray solution use one 8.1 L jug of Merge for every case of FlaxMax Ultra, regardless of whether the 20 or 27 acre per case rate FlaxMax Ultra is being used.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

$19.28 to $26.03 per acre

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 35 to 40 psi (240 to 275 kPa).

# Fortress

### Herbicide Group – 3, 8

*(Refer to page 27)*

## Company:

Gowan Canada (PCP#19521)

## Formulation:

10 percent triallate and 4 percent trifluralin formulated as a granular.

Container size - 22.7 kg bag, 454 kg container.

## Crops and Staging:

Prior to planting wheat (spring and durum), barley, canola, flax (not including Solin), mustard.

**Preplant incorporated:** In fall after September 15 until soil freeze-up or in the spring prior to seeding crop.

**Surface application:** Apply in the fall after October 1 and when soil temperature is less than 4°C at a 2 inch (5 cm) depth and delay incorporation until the following spring.

Do not apply to fields with heavy trash cover or after snow has fallen. Some wheat or barley injury may be noted on eroded knolls.

## Weeds and Staging:

Pre-emergent control of wild oats, green foxtail, yellow foxtail.

Suppression of lamb's-quarters, kochia, redroot pigweed, Russian thistle, wild buckwheat.

## Cost (2005 suggested retail price):

$15.22 to $23.53 per acre.

## Rates:

Apply Fortress according to soil organic matter content.

| ORGANIC MATTER | RATE (KG/ACRE) | | | | | |
|---|---|---|---|---|---|---|
| | RAPESEED (CANOLA), FLAX***, MUSTARD | | BARLEY | | SPRING WHEATAND DURUM WHEAT | |
| | Spring | Fall | Spring | Fall | Spring | Fall |
| < 2% | 5.67 | 5.67 | N.R.* | 4.45 | N.R.* | N.R. * |
| 2 - 4% | 5.67 | 5.67 | 4.45 | 5.67 | N.R.* | 4.45 |
| 4 - 6% | 6.88 | 5.67 | 5.67 | 5.67 | 4.45 | 5.67 |
| > 6% | 6.88 | 6.88 | 6.88 | 6.88 | 5.67 | 5.67** |

* N.R. - Not Recommended.

** For fall incorporated applications (not surface) apply 6.88 kg/acre when organic matter exceeds 8 percent.

*** Excluding Solin (low linolenic acid) varieties.

## Application Information:

Fortress may be applied in the fall with or without a fall tillage operation, or in the spring as a preplant incorporated treatment. Before application of this product, the soil must be in good working condition. Application to a field that is wet, lumpy, rough or ridged will result in reduced weed control and promote crop thinning.

**Fall Surface Application:** Where fields are prone to water and/or wind erosion, and tillage is therefore undesirable, fall surface application should be made when the soil begins to cool (less than 4°C) and within 3 weeks of soil freeze-up, which usually occurs by October 1. Application can be made to standing stubble or to previously worked fields with incorporation delayed until spring. For best results on heavy wild oat infestations, use the incorporated treatment.

**Fall Incorporated Application:** Fortress must be applied after September 15 and before soil freeze-up. Application prior to September 15 may result in reduced weed control. An incorporation may be completed within 24 hours of application. The second incorporation may be done in the fall (prior to soil freeze-up) or in the spring prior to, or after, seeding. If performed after seeding, it must be completed with harrows prior to emergence of the crop. Fall incorporation is not recommended on soils where a lack of trash cover combined with the required incorporation operation could result in soil erosion.

**Spring Application:** Fortress can be applied before seeding but must be incorporated within 24 hours of application. The second incorporation must be delayed at least 48 hours after the first and may be performed at any time prior to crop emergence.

## Incorporation:

Fortress applications require two incorporations, with the second incorporation at right angles to the first. Seeding with a seeder that provides soil disturbance equivalent to a cultivator may replace one incorporation. Incorporate to a maximum depth of 2 inches (5 cm) by setting disk or cultivator implements to cut a maximum of 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. If the second incorporation is conducted after seeding, it should be done with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective in-corporation if compact soil prevents penetration of harrow teeth, if trash accumulates in the harrow sections, or if the harrows bounce. Seeding Requirements: Accurate seeding depth control is critical. Thinning of wheat and barley has been known to occur when seeding depth has been inadequate. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). Do not seed deeper than 3 inches (7.5 cm). To ensure an even crop stand, increase the usual seeding rate of wheat or barley by 10 percent, especially if soil conditions are cold or dry. See product label for more information.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Crop injury can occur on fields where Fortress has been applied and heavy rainfall or cold weather occur after seeding but prior to crop emergence. Seeding under warm soil conditions (greater than 10°C and generally after May 15) will ensure optimum crop germination and emergence and will reduce the risk of crop injury. Very dry conditions in spring or prolonged cool soil temperatures at time of wild oat germination will result in reduced control. Poor results may be expected from incomplete incorporation due to wet, cloddy soil or heavy trash. Ridges left at seeding may disrupt the treated layer and allow weed escapes.

## Restrictions:

**Rainfall:** Moisture is required for activation. Rainfall of at least 0.6 inches (1.5 cm) within 2 weeks of seeding is required to ensure optimum results.

**Grazing:** Do not graze or cut treated crops for livestock feed prior to crop maturity.

**Recropping:** Fortress will leave a residue in the soil. Oats, canaryseed, and small seeded forage grasses may be injured if planted within 24 months of application. Do not apply Fortress on land to be sown to wheat if the land has been treated with trifluralin since June 1 of the previous year.

**Aerial Application:** May be applied by airplane with attachments designed for applying low volumes of granules.

**Storage:** Store in a cool, dry place.

## Hazard Rating:

Skin and Eye Irritant

# Frontier

Herbicide Group – 15
*(Refer to page 27)*

## Company:

BASF Canada (PCP#23462)

## Formulation:

900 g/L dimethanamid formulated as an emulsifiable concentrate. Container size - 10 L

## Crops and Staging:

**Pre-plant incorporated:**
Corn (not sweet corn, popcorn, or corn grown for seed)
Dry beans (white and kidney beans only)

**Pre-emergence surface:**
Dry beans (white and kidney beans only).

## Weeds and Staging:

Pre-emergent control of green foxtail.

## Rates:

**Pre-plant incorporated treatments:**
Apply at 0.51 to 0.57 L/acre. Apply at the higher rate on fine-textured or high organic soils and for heavier anticipated weed problems.

**Pre-emergence treatments:**

| | RATE (L/ACRE) | | |
|---|---|---|---|
| SOIL TYPE | Less than 3% Organic Matter | 3 to 6% Organic Matter | 7 to 10% Organic Matter |
| Coarse Textured Soils | 0.45 | 0.45 | 0.51 |
| Medium and Fine Textured Soils | 0.45 | 0.51 | 0.57 |

**Cost** (2005 suggested retail prices):
$18.72 to $23.71 per acre.

## Application Information:

**Water Volume:** A minimum of 40 L per acre.

**Pressure:** 30 to 45 psi (200 to 300 kPa).

**Nozzles:** Flat fan. Use 16 mesh suction screen, 50 mesh elsewhere on sprayer.

**Incorporation:** For pre-plant incorporated treatments, apply Frontier as a broadcast treatment and incorporate using a harrow, rolling cultivator or other implement capable of giving uniform, shallow incorporation into the top 5 cm (2 inches) of soil within 7 days of planting. Avoid deeper incorporation or reduced weed control and/or crop injury may result. Immediate incorporation after application is not necessary.

Beans must be planted at least 4 cm (1.5 inches) deep or crop injury may occur.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Rainfall is required within 7 to 10 days of application to activate and move Frontier into the soil zone. If dry conditions persist, a shallow cultivation or the use of a rotary hoe is necessary to move the herbicide into moist soil and control weed escapes. Shallow tillage is important to minimize dilution of the herbicide. If drought conditions persist after pre-plant incorporated or pre-emergence applications, weed control may not be adequate.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** May be applied with a liquid fertilizer carrier. Test compatibility of Frontier with liquid fertilizer by mixing a small amount of herbicide with a proportional quantity of liquid fertilizer in a jar. May also be impregnated on dry bulk fertilizers for pre-plant incorporated treatments. A minimum of 90 kg/acre of dry bulk fertilizer should be applied. Do not impregnate Frontier on nitrate fertilizers, superphosphates or limestone.

**Insecticides:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Rainfall after application is important for good weed control.

**Grazing:** Do not graze or feed the treated corn crop within 40 days of application. Do not graze the treated bean crop or feed bean forage, hay or straw to livestock.

**Recropping:** Do not plant winter wheat within 120 days of application.

**Aerial Application:** Not registered.

**Storage:** Do not freeze. Must be stored under heated warehouse conditions.

**Environment:** Avoid drift onto non-target plants. Leave a buffer of 15 meters from water bodies and wetland areas.

## Tank Cleaning:

The manufacturer does not provide information on tank cleaning. Generally, a mixture of water and household ammonia (1 L per 100 L of water) flushed twice through the tank and circulated through the lines and nozzles is an effective method of cleaning the sprayer tank.

## Hazard Rating:

▽ Caution Poison.

Warning Eye Irritant and Potential Skin Sensitizer.

# Frontline 2,4-D

**Herbicide Group – 2, 4**
*(Refer to page 27)*

## Company:

Dow AgroSciences

## Formulation:

The Frontline 2,4-D package has 2 components:

**Frontline 2,4-D A (PCP#27242):** 50 g/L florasulam formulated as a suspension concentrate

**Frontline 2,4-D B (PCP#27243):** 564 g/L 2,4-D LV ester formulated as an emulsifiable concentrate.

Container sizes – Frontline 2,4-D A - 1.6 L, Frontline 2,4-D B – 2 x 8 L.

## Crops and Staging:

Spring wheat (including durum) in the fully expanded 3 leaf to 6 leaf stage.

When mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Broadleaf weeds controlled at the 2 to 4-leaf stage:**

Bluebur
Burdock
Chickweed
Cleavers
Cocklebur
Dandelion*
Flixweed
Kochia**
Lady's-thumb
Lamb's-quarters
Mustard (ball, wild)
Narrow-leaved hawk's-beard***
Plantain
Prickly lettuce
Ragweed (common)
Redroot pigweed
Russian thistle
Shepherd's-purse
Smartweed
Sow-thistle (annual)
Stinkweed
Sunflower (annual)
Tartary buckwheat
Vetch
Volunteer canola†
Wild buckwheat
Wild radish

**Broadleaf weeds suppressed:**

Canada thistle (top growth control only)
Hemp-nettle
Perennial sow-thistle (top growth control only)

*   Seedlings and overwintered rosettes
**   Up to 5 cm (2 inches) in height.
***   Up to 2 leaf stage.
†   Including all herbicide-tolerant canola varieties

## Cost (2005 suggested retail price):

$6.44 per acre..

## Rate:

**Frontline 2,4-D A:** 40 mL/acre

**Frontline 2,4-D B:** 0.4 L (400 mL)/acre.

One case treats 40 acres.

Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13 of the Guide to Crop Protection.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Use nozzles capable of delivering appropriate pressures and volumes.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of Frontline 2,4-D. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at, or following time of application may reduce weed control and increase the risk of crop injury at all stages of growth.

## Tank Mixes:

**Herbicides:**

***In spring wheat (including durum):***

Assert 300 SC (0.65 L/acre) plus Acidulate
Everest (17.4 g/acre) plus recommended surfactant.
Puma$^{120}$ Super (0.154 L/acre)

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note: The above mixes are those listed on the Frontline 2,4-D label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest forage or cut hay within 30 days of application.

**Pre-harvest Interval:** Leave 60 days between application and harvesting mature crop.

**Recropping:** Wheat, barley, canola, oats and peas may be grown the year following an application.

**Aerial Application:** Do not apply by air.

**Storage:** Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

**Environment:** Leave a buffer zone of at least 30 m between the downwind edge of the boom and the closest edge of non-target areas such as shelterbelts, hedgerows and shrublands. A buffer zone of at least 15 m is required between the downwind edge of the boom and the closest edge of water or wetland areas such as ponds, streams, rivers, prairie potholes and sloughs.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◈ Warning Poison

May cause skin and eye irritation

# Frontline

**Herbicide Group – 2, 4**
*(Refer to page 27)*

## Company:

Dow AgroSciences

## Formulation:

**The Frontline package contains 2 components:**

**Frontline A (PCP#27029):** 50 g/L florasulam formulated as a suspension concentrate. Container size - 1.6 L

**Frontline B (PCP#27030):** 500 g/L MCPA Ester formulated as an emulsifiable concentrate. Container size - 11.2 L.

## Crops and Staging:

Spring wheat (including durum), barley and oats in the 2 to 6 leaf stage.

When tankmixing, always check the tankmix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Broadleaf weeds controlled at the 2 to 4 leaf stage:**

Ball mustard
Burdock**
Chickweed
Cleavers
Flixweed
Hemp-nettle◆
Kochia**
Lamb's-quarters
Prickly lettuce**
Ragweed (common)
Redroot pigweed◆
Russian pigweed**
Shepherd's-purse
Smartweed
Stinkweed
Sunflower (annual)**
Volunteer canola (all varieties)*
Wild mustard
Wild buckwheat

**Broadleaf weeds suppressed:**

Canada thistle ◆†
Dandelion ◆•
Plantain†
Stork's-bill◆
Sow-thistle (annual)
Sow-thistle (perennial)†

* including all herbicide-tolerant canola varieties
** up to the 4 leaf stage of development
◆ for improved control of this weed add an additional 57 ml per acre of MCPA LV500 (Frontline B)
† top growth control
• seedlings and overwintered rosettes less than 15cm (6 inches)

## Cost (2005 suggested retail price):

$7.45 per acre.

## Rate:

**Frontline A:** 40 mL per acre

**Frontline B:** 280 mL per acre

One case treats 40 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** A minimum of 40 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Use nozzles capable of delivering appropriate pressures and volumes.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of Frontline. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at or following time of application may increase the risk of crop injury at all stages of growth.

## Tank Mixes:

**Herbicides:**

***In spring wheat (including durum) and barley only:***

Assert (0.65 L/acre) plus Acidulate.

Puma$^{120}$ Super (155 mL/acre or 310 mL/acre).

***In spring wheat (including durum) only:***

Horizon (93 or 117mL/acre) plus Score adjuvant.

Everest at 17.4 g/acre plus Ag-Surf or Agral 90 adjuvant

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Frontline label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze treated crop or cut for feed within 7 days of application.

**Preharvest Interval:** Do not apply within 60 days of harvest.

**Recropping:** Wheat, barley, oats, canola and peas may be grown the year following an application.

**Aerial Application:** Do not apply by air.

**Storage:** Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

**Environment:** Leave a buffer zone of at least 30 m between the downwind edge of the boom and the closest edge of non-target areas such as shelterbelts, hedgerows and shrublands. A buffer zone of at least 5 m is required between the downwind edge of the boom and the closest edge of water or wetland areas such as ponds, streams, rivers, prairie potholes and sloughs.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

◈ Warning Poison

May cause eye and skin irritation irritation

# Fusion

**Herbicide Group – 1**
*(Refer to page 27)*

## Company:

Bayer CropScience

## Formulation:

One case of Fusion contains:

**Component 1 (PCP#22845):** 80.5 g/L fenoxaprop-p-ethyl. Container size - 3.7 L.

**Component 2 (PCP#22850):** 125 g/L fluazifop-p-butyl. Container size - 6.5 L.

Both components are formulated as emulsifiable concentrates.

## Crops and Staging:

Crops are tolerant at all stages but the following preharvest restrictions apply:

| CROP | STAGING |
|---|---|
| Canola | Do not apply beyond the 5 leaf stage, 80 day preharvest interval |
| Flax (including Solin) | Tolerant at all growth stages, 80 day preharvest interval |
| Field peas | Tolerant at all growth stages, 75 day preharvest interval |
| Lentils | Do not apply beyond the 6 node stage, 82 day preharvest interval |
| Mustard | Do not apply beyond the 5 leaf stage, 70 day preharvest interval |

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

Apply at the 1 to 6 leaf stage of the following annual grassy weeds. Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occur when weeds are controlled before tillering.

Barnyard grass
Green foxtail
Persian darnel
Volunteer barley
Volunteer wheat
Wild oats

## Cost (2005 suggested retail price):

$11.95 per acre.

## Rates:

**Component 1:** 0.19 L/acre.

**Component 2:** 0.32 L/acre.

One case treats 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 23 to 45 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** 80° or 110° stainless steel flat fan nozzles tilted forward at a 45° angle.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

If daytime temperatures before or after application are very hot and dry with low humidity, reduced control may result. Do not apply to crop that is stressed (frost, heat, drought, water saturated soil, disease, etc.) as crop injury may result.

## Tank Mixes:

**Herbicides:**

***Canola:***

Lontrel (0.23 L/acre).

Muster (8 to 12 g/acre) (Argentine varieties only)

***In Liberty Link canola only:***

Liberty at 1.1 to 1.35 L/acre plus Fusion at 40 acres per case may be tank mixed to enhance control of wild oat and volunteer cereals.

***Flax (including Solin):***

Buctril M (0.40 L/acre).

***Flax (not including Solin):***

MCPA ester or amine (up to 0.34 L/acre - 500 g/L formulations).

Under adverse conditions, tank mixes of Fusion and Buctril M or Fusion and MCPA may result in reduced grassy weed control.
Curtail M (0.6 to 0.8 L/acre)

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

Note: An interval of 4 days prior to, or 4 days after application of Fusion is required before any other pesticide can be applied (unless registered in a Fusion tank mix).

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

**Note: The above mixes are those listed on the Fusion label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

## Restrictions:

**Rainfall:** Within 2 hours may result in reduced control. **Grazing:** Do not graze treated crops or cut for feed prior to crop maturity.

**Recropping:** If it is necessary to re-seed a crop within 60 days of applying Fusion herbicide, seed only the broadleaf crops listed on the Fusion label. If tank mixed with a broadleaf herbicide refer to both labels for recropping information. There are no recropping restrictions for Fusion herbicide applied alone the year after application.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze.

**Environment:** Do not apply within 15 m of non-target areas, water or wetland areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

☠ Caution Poison

Warning Eye and Skin Irritant

Experimental studies have shown that the active ingredient in Component 2 may cause birth defects in laboratory animals. Women capable of bearing children should avoid contact with this product.

# glyphosate

**Herbicide Group – 9**
*(Refer to page 27)*

## Company, Formulation and Cost (2005 suggested retail prices):

| Product Name | Company | Salt* | Glyphosate acid content | Formulation | Container size** | Cost |
|---|---|---|---|---|---|---|
| Credit (PCP#25866) | Nufarm Agriculture | IPA | 356 g/L | Solution | 1, 2, 3 | $7.40 per L |
| Factor (PCP#27090) | IPCO | IPA | 356 g/L | Solution | 1, 2 | $6.75 per L |
| Glyfos (PCP#24359) | Cheminova | IPA | 360 g/L | Solution | 1, 2, 3, 5 | $8.95 per L |
| Maverick (PCP#26429) | Dow AgroSciences | IPA | 356 g/L | Solution | 1, 2 | $7.99 per L |
| Renegade (PCP#20864)† | Monsanto | IPA | 356 g/L | Solution | 1, 2 | $7.99 per L |
| Renegade HC (PCP#27946) | Monsanto | K+ | 540 g/L | Solution | 1, 2, 3, 5 | N/A |
| Roundup Dry (PCP#24874) | Monsanto | MA | 68.5% granule | Soluble | 7 | $16.33 per kg |
| Roundup Original† (PCP#13644) | Monsanto | IPA | 356 g/L | Solution | 1, 2, 4 | $8.99 per L |
| Roundup Transorb† (PCP#25344) | Monsanto | IPA | 360 g/L | Solution | 1, 2, 3, 4, 6 | $9.79 per L |
| Roundup Ultra (PCP#27764) | Monsanto | K+ | 540 g/L | Solution | 1, 2, 3, 5 | $14.69 per L |
| Roundup WeatherMax (PCP#27487) | Monsanto | $K^+$ | 540 g/L | Solution | 1, 2, 3, 5 | $14.97 per L |
| Touchdown iQ (PCP#27192) | Syngenta | DA | 360 g/L | Solution | 1, 2, 3 | $9.89 per L |
| Vantage (PCP#26172)† | Dow AgroSciences | IPA | 356 g/L | Solution | 1, 2, 3 | $8.95 per L |
| Vantage Plus (PCP#26171) | Dow AgroSciences | IPA | 360 g/L | Solution | 1, 2, 3 | $9.79 per L |

* Salt type: IPA = Isopropylamine, MA = Monoammonium, DA = Diammonium, $K^+$ = Potassium

** Container sizes available: 1) 2 x 10 L 2) 115 L 3) 450 L 4) 750 L 5) 1000 L 6) 1200 L 7) 10.4 kg

† These formulations are no longer in production but some supplies may still remain in the retail system. These formulations may be removed from future editions of this publication.

Some products may be more effective (not related to higher glyphosate content) under adverse conditions, but that benefit is reduced when applications are made under optimal conditions for activity (i.e. rapid weed growth). When selecting a glyphosate product, consult the product manufacturer or ask your retailer about differences in the level of post-sales support provided for different products.

## Crops and Uses:

1. Annual weed control prior to crop emergence or in summerfallow.
2. Quackgrass control prior to seeding or after harvest.
3. Dandelion control (other than preharvest).
4. Canada thistle control in summer-fallow, shelterbelts and post-harvest.
5. Alfalfa control (other than preharvest).
6. Other perennial weeds control in summerfallow, shelterbelts and post-harvest.
7. Patch treatments of perennial weeds in cereals, corn, soybean and forages.
8. Preharvest perennial weed control.
9. For use in Roundup Ready (glyphosate tolerant) crops.
10. Tank Mixes.

## 1. Annual weed control prior to crop emergence or in summer-fallow:

**Weeds, Rates and Staging:**

| PRODUCTS | RATE PER ACRE | SURFACTANT* | WEEDS CONTROLLED | WEED STAGE |
|---|---|---|---|---|
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 0.30 L | 0.14 L/ acre | **Grasses:** Green foxtail, volunteer cereals, wild oat (light infestations)<br>**Broadleaves:** lady's- thumb, stinkweed, volunteer canola (NOT including Roundup Ready varieties), wild mustard | Less than 3 inches (8 cm) high.<br>Apply at the 1 to 3 leaf stage of wild oat. |
| Roundup Dry | 0.16 kg | | | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.20 L | | | |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 0.40 L | 0.14 L/ acre | Above weeds plus:<br>**Grasses:** heavy infestations of wild oat<br>**Broadleaves:** suppression of flixweed, kochia | 1 to 3 leaves for wild oat.<br>Weeds 3 to 6 inches (8 to 15 cm). |
| Roundup Dry | 0.21 kg | | | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.27 L | | | |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage,Vantage Plus | 0.51 to 0.77 L | Not required | Above weeds plus:<br>**Grasses:** downy brome, Persian darnel,<br>**Broadleaves:** Canada fleabane, cleavers**, common ragweed, flixweed,hemp-nettle, lamb's-quarters,narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, volunteer flax, wild buckwheat | Canada fleabane, common ragweed less than 3 inches(8 cm) high. Other weeds less than 6 inches (15 cm).<br>Use high rate for narrow-leaved hawk's-beard 3 to 6 inches (8- 15 cm) or wild buckwheat at the 3-4 leaf stage. |
| Roundup Dry | 0.27 to 0.40 kg | | | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.33 to 0.51 L | | | |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 0.91 | Not required | Above weeds plus:<br>**Grasses:** annual blue grass, crabgrass,<br>**Broadleaves:** annual sow-thistle, kochia, prickly lettuce, shepherd's purse | Less than 6 inches (15 cm) high |
| Roundup Dry | 0.48 kg | | | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.61 L | | | |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.42 L | Not required | Above weeds | Greater than 6 inches (15 cm) high |
| Roundup Dry | 0.74 kg | | | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.94 L | | | |

* Unless otherwise specified, use one of the following surfactants: Agral 90, Agsurf, Companion, Enhance, Frigate or LI 700.

** Registered for control with Roundup Original, Roundup Transorb, Vantage and Vantage Plus only.

## 2. Quackgrass control prior to seeding or after harvest:

| PRODUCT | RATE PER ACRE | QUACK GRASS STAGE |
|---|---|---|
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.0 L | Season long control of light to moderate infestations. Apply when quack grass is 8 inches (20 cm) tall and has 3 to 4 actively growingleaves. Apply spring or fall. |
| Roundup Dry | 0.53 kg | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.67 L | |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.0 to 2.8 L | Apply when quack grass has 3-4 new leaves for long term control of heavy infestations. Use high rate for sod-bound quack grass (left undisturbed for at least 2 years). |
| Roundup Dry | 0.53 to 1.5 kg | |
| Renegade HC, Roundup Ultra, Roundup, WeatherMax | 0.67 to 1.89 L | |

Do not apply fall treatments if a hard frost has occurred (-5°C) or if plants are drought stressed. Spread straw to allow regrowth and good spray coverage.

Cultivation prior to application will result in reduced control. Do not cultivate between harvest and treatment when using fall applications. If using spring applications on fields which have been fall-tilled, delay application until the quack grass has reached the 4 to 5 leaf stage. (This will occur 1 to 4 weeks later on fall-tilled fields than in undisturbed fields).

Cultivation after application usually will improve control of quack grass. Wait a minimum of 3 days after application before cultivating. If growing conditions are poor (cold or dry), particularly in the fall, waiting longer than 5 days may improve control.

## 3. Dandelion control (other than preharvest):

Apply up to and including dandelion bloom for best results.

| PRODUCT | **Less than 6 inches (15 cm) diameter. Allow 3 or more days after treatment before tillage.** | **Greater than 6 inches (15 cm) diameter. Use higher rate when infestation is heavy.** | **Prior to seeding or after harvest. Use higher rate for weeds beyond 3 inches (8 cm) or for heavy infestation. Allow 7 or more days after treatment before tillage.** |
|---|---|---|---|
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Vantage, Vantage Plus | 1.0 L/acre | 1.5 to 2.0 L/acre | – |
| Roundup Dry | 0.53 kg/acre | 0.80 to 1.06 kg/acre | – |
| Touchdown iQ | 1.0 L/acre | 1.5 to 2.0 L/acre | 1.82 to 2.83 L/acre |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.67 L/acre | 1.0 to 1.34 L/acre | – |

## 4. Canada thistle control in summer-fallow, shelterbelts and post-harvest:

| PRODUCT | RATE PER ACRE | WEED STAGING |
|---|---|---|
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.9 to 2.8 L | Bud stage or beyond. Allow at least 5 days after application before tillage. |
| Roundup Dry | 1 to 1.5 kg | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 1.28 to 1.89 L | |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.0 L | Rosettes at least 6 inches (15 cm) in diameter, treated in late summer, following tillage in spring and early summer (up to August 1). Allow thistles to regrow for 5 weeks following last tillage. Wait a minimum of 10 days after application before tillage. Treatment after a mild frost is possible if leaves are green and pliable and plants are actively growing. |
| Roundup Dry | 0.53 kg | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.67 L | |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.9 to 2.8 L | Post-harvest stubble treatment. Allow 8-10 inches (20-25 cm) of new growth before application. must be Plants sprayed at least 2 weeks prior to killing frost. Straw should be removed or evenly spread to allow for proper regrowth and spray coverage. |
| Roundup Dry | 1.0 to 1.5 kg | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 1.28 to 1.89 L | |

## 5. Alfalfa Control (other than preharvest):

| PRODUCT | RATE PER ACRE | WEED STAGING |
|---|---|---|
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.5 to 2.0 L | Fall control of alfalfa in early bud to full bloom stage. Use high rate when alfalfa populations are high or when perennial grasses are present. Allow at least 5 days before tillage. See tank mix section for minimum tillage or spring applications. Apply with 23-135 L/acre water. |
| Roundup Dry | 0.8 to 1.1 kg | |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 1.0 to 1.34 L | |
| Touchdown iQ | 0.91 to 1.82 L | Prior to seeding or after harvest. Use higher rate for weeds beyond 3 inches (8 cm) in height or for heavy weed infestations. Wait 7 days after application for tillage. Apply in 23-135 L/acre water. |

## 6. Other perennial weed control in summerfallow, shelterbelts and post-harvest:

**(Refer to individual product labels for detailed application information.)**

| | RATES IN UNITS PER ACRE | | |
|---|---|---|---|
| | **Foxtail Barley Seedling to heading*** | **Toadflax (vegetative stage in summer fallow)** | **Other Perennial weeds**** |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.0 to 2.0 L (0.4 L - suppression only) | 1.0 L | 4.9 L |
| Roundup Dry | 0.53 to 1.1 kg | 0.53 kg | 2.5 kg |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.67 to 1.34 L/acre | 0.67 L | 1.89 to 3.24 L |

* Late fall applications may provide better control of established foxtail barley plants than spring applications.

** Perennial weeds such as absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

## 7. Patch treatments of perennial weeds in wheat, oat, barley, corn, soybean, forage legumes and forage grasses:

**(refer to product label for detailed application instructions)**

| | RATES PER ACRE | | | | |
|---|---|---|---|---|---|
| | **Quack grass 8 in (20 cm) tall** | **Canada thistle Bud or beyond** | **Milkweed Bud to bloom** | **Other perennial weeds*** | **Spot treatment rates for hand held equipment (per 10 L water**)** |
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.0 to 2.8 L | 1.9 to 2.8 L | 4.9 L | 2.8 to 4.9 L | 100 to 200 mL |
| Roundup Dry | 0.53 to 1.5 kg | 1.0 to 1.5 kg | 2.5 kg | 1.5 to 2.5 kg | 50 to 100 g |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.67 to 1.89 L | 1.28 to 1.89 L | 3.24 L | 1.89 to 3.24 L | 67 to 134 mL |

* Perennial weeds such as absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

** Use the low rate for quack grass and the high rate for all other perennials.

## 8. Preharvest perennial weed control:

**Crops registered and rates (per acre):**

| Product | Barley*, bean (dry), canola, field pea, Flax (including solin) lentil, oat*, soybean wheat. | Oat | Forages |
|---|---|---|---|
| Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus | 1.0 L | 1.0 L | 1.0-2.0 L |
| Roundup Dry | 0.53 kg | 0.53 kg | 0.53-1.06 kg |
| Renegade HC, Roundup Ultra, Roundup WeatherMax | 0.67 L | 0.67 L | 0.67 to 1.34 L |

Do not apply to any crops grown for seed.

* Registered for application to barley grown for malt and tame oat grown for milling. Contact malt barley or milling oat buyers prior to application to confirm acceptance of glyphosate-treated grain.

**Weeds Controlled with preharvest applications:**

| Product | Quack grass 4-5 green leaves | Canada thistle and perennial sow-thistle at bud stage or beyond | Common milkweed at bud to bloom stage | Toadflax at bud to full bloom stage | Dandelion from rosette to full bloomstage |
|---|---|---|---|---|---|
| Credit, Factor, Glyfos,<br>Maverick, Renegade,<br>Roundup Dry,<br>Roundup Original,<br>Roundup Transorb,<br>Renegade HC, Roundup Ultra,<br>Roundup WeatherMax<br>Touchdown iQ,<br>Vantage, Vantage Plus | X | X | X | X | X |

**Crop Staging for preharvest applications:**

Apply to crops (except forage) when grain moisture is less than 30%. The following chart lists visual symptoms that can be used as guidelines to when 30% grain moisture has been reached.

| CROP* | VISUAL SYMPTOMS |
|---|---|
| Wheat, Barley, Oat | Hard dough stage – a thumbnail impression remains on seed. |
| Canola | Pods are green to yellow and most seeds are yellow to brown. |
| Flax (including Solin) | Majority (75 to 80% of bolls) are brown. |
| Lentil | Lowermost pods (bottom 15%) are brown and rattle when shaken. |
| Pea | Majority (75 to 80%) of pods are brown. |
| Soybean | Stems are green to brown in colour and pod tissue is brown and dry in appearance (80 to 90% leaf drop). |
| Dry Bean | Stems are green to brown in colour and pods are mature (yellow to brown) and 80 to 90% of the original leaves have dropped. |
| Forage | 3 to 7 days prior to the last cut before rotation or forage renovation. Do not apply to forage stands that are to be maintained. |

*See the crops section for a guide to the products registered on each crop.

## 9. For Use in Roundup Ready (glyphosate tolerant) Crops including:

**Roundup Ready Canola:** (Factor, Glyfos, Roundup Original, Roundup Transorb, Renegade HC, Roundup Ultra, Roundup WeatherMax, Touchdown iQ, Vantage, Vantage Plus only)

**Roundup Ready Field corn:** (Factor, Glyfos, Roundup Original, Roundup Transorb, Renegade HC, Roundup Ultra, Roundup WeatherMax, Vantage and Vantage Plus only)

**Roundup Ready Soybean:** (Factor, Glyfos, Roundup Original, Roundup Transorb, Renegade HC, Roundup Ultra, Roundup WeatherMax, Touchdown iQ, Vantage, Vantage Plus only)

## Weeds, Staging and Rates in Roundup Ready Canola:

All applications must be made within the cotyledon to 6 leaf stage of RR canola.

Temporary yellowing may occur if applied at the 4 to 6 leaf stage of the crop.

| PRODUCT | RATE (L/ACRE) | WEEDS CONTROLLED |
|---|---|---|
| Factor<br>Glyfos<br>Renegade<br>Roundup Original<br>Roundup Transorb<br>Touchdown iQ<br>Vantage<br>Vantage Plus<br>Renegade HC†,<br>Roundup Ultra†<br>Roundup WeatherMax†<br>(rates given in brackets) | 0.33-0.50<br>(0.22 to 0.34)† | **Annual grasses:** barnyard grass◊,***, green foxtail, volunteer cereals, wild oat<br>**Annual broadleaves:** annual smartweed spp.**, chickweed, corn spurry, cow cockle*, hemp-nettle, kochia, lamb's-quarters, night-flowering catchfly*, red-root pigweed, Russian thistle, shepherd's-purse*, stinkweed, volunteer canola (except Roundup Ready varieties), wild mustard, wild tomato. |
| | 0.50<br>(0.34)† | **Annual broadleaves:** cleavers, flixweed◊, wild buckwheat, stork's-bill◊, narrow-leaved hawk's-beard◊<br>**Perennial weeds suppressed:** Canada thistle, dandelion, perennial sow-thistle, and season long quack grass control. |
| | 2nd application at 0.5 L (0.34 L)† per acre | **Annual broadleaves:** round-leaved mallow◊<br>**Season long control of following perennials:** Canada thistle, foxtail barley◊, and perennial sow-thistle. |
| Factor, Glyfos, Renegade, Roundup Original, Roundup Transorb, Roundup WeatherMax†<br>(rates given in brackets)<br>Touchdown iQ | 0.75<br>(0.51 L)† | **Season long control of following perennials:** Canada thistle, foxtail barley, and perennial sow-thistle. |

† Rates in brackets for Roundup WeatherMax and Roundup Ultra only.

* Low rates can be used only up to the 3 leaf stage of the crop otherwise use the high rate.

** Low rates can be used only when annual smartweed is in the 4 to 6 leaf stage.

*** Not registered for control with Roundup Ultra.

◊ Not registered for control with Vantage or Vantage Plus.

**NOTE: A maximum of 1.0 L/acre (0.67 L/acre for Roundup Ultra and WeatherMax) per season is allowed in Roundup Ready Canola.**

## Weeds, Staging and Rates in Roundup Ready Corn and Roundup Ready Soybean:

**All applications must be made within the following crop growth stages.**

***Corn*** **- 1-8 leaf stage**
***Soybean*** **- first trifoliate leaf through flowering.**

| PRODUCT | RATE (L/ACRE) | WEEDS CONTROLLED |
|---|---|---|
| Factor,<br>Glyfos<br>Renegade<br>Roundup Original<br>Roundup Transorb<br>Touchdown iQ***<br>Vantage<br>Vantage Plus<br>Renegade HC†,<br>Round Ultra†<br>Roundup WeatherMax†<br>(rates given in brackets) | 1.0 (0.67)†<br>Apply when weeds are less than 10 inches or 25cm high to maximise weed control and crop yield. | **Grasses:**<br>barnyard grass<br>crabgrass spp.<br>foxtail (green, yellow, giant)<br>proso millet◆<br>quack grass<br>volunteer barley and wheat◆◆<br>wild oats◆◆<br>**Broadleaves:**<br>chickweed◆◆<br>cleavers◆◆<br>corn spurry◆◆<br>cocklebur<br>cow cockle◆◆<br>common milkweed (suppression only)◆<br>common ragweed<br>eastern-black flowering night-shade<br>flixweed◆◆<br>hemp-nettle◆◆<br>kochia◆◆<br>lamb's-quarters<br>narrow-leaved hawk's-beard◆<br>night-flowering catchfly◆◆<br>pigweed (smooth, redroot)<br>round-leaved mallow◆◆<br>Russian thistle◆◆<br>shepherd's-purse◆◆<br>smartweed spp.<br>stinkweed◆◆<br>stork's-bill◆◆<br>velvetleaf<br>volunteer canola (except Roundup Ready varieties)◆◆<br>wild mustard<br>wild buckwheat<br>wild tomato◆◆<br>yellow nutsedge (suppression)◆ |
| | 2nd application at 1.0 L (0.67L)† per acre. Late flushes of the above weeds. | **Late flushes of heavy infestations of the above weeds plus control of:**<br>Canada thistle◆, common milkweed, perennial sow-thistle◆, yellow nutsedge |

**Additional Weeds, Staging and Rates in Roundup Ready Soybean only:**

| PRODUCT | RATE (L/ACRE) | WEEDS CONTROLLED |
|---|---|---|
| Factor, Glyfos<br>Renegade HC†,<br>Roundup Original<br>Roundup Transorb<br>Round Ultra†<br>Roundup WeatherMax†<br>(rates given in brackets)<br>Touchdown iQ | one application of 2.0 L (1.35 L)† per acre | **Heavy infestations of the annual weeds listed above plus control of:**<br>Field Bindweed, Common Milkweed, Perennial sow-thistle, Canada thistle, and yellow nutsedge |

† Rates in brackets for Roundup WeatherMax and Roundup Ultra only.
*** Not registered for use in Roundup Ready Corn.
◆ Registered for control with Vantage or Vantage Plus in Roundup Ready corn only.
◆◆ Registered only with Factor, Glyfos, Renegade, Roundup Original, Roundup Transorb, Roundup Ultra and Roundup WeatherMax only in RR corn.

**Tank mixes in Roundup Ready Crops:**

***Canola:*** Factor, Glyfos, Renegade HC, Roundup Original, Roundup Transorb, Roundup Weathermax, Touchdown iQ, Vantage, and Vantage Plus only with Lontrel at 112 mL/acre.

***Soybean:*** Factor, Glyfos, Renegade HC, Roundup Original and Roundup Transorb, Roundup Weathermax only with Assure II at 154 mL/acre for volunteer RR corn control.

***Corn:*** Glyfos, Renegade HC, Roundup Transorb, and Roundup Weathermax only with Atrazine at 0.63 to 0.84 L/acre of 480 to 500 g/L formulations or 0.34 to 0.45 kg/acre of 90% dry formulations for residual control of annual broadleaf weeds.

## 10. Tank Mixes: (NR = Not Registered)

| | RATE PER ACRE | Factor | Renegade, Roundup Original, Roundup, Transorb, Renegade HC†, Roundup , Ultra†, Roundup WeatherMax†. († rates given in brackets) | Credit, Glyfos, Maverick, Vantage, Vantage Plus | Touchdown iQ | Roundup Dry |
|---|---|---|---|---|---|---|
| *Preseeding cereals**:* | **2,4-D◊<br>(0.23 to 0.58L)*** | 0.5 to 0.8 L | 0.5 to 0.8 L<br>†(0.34 to 0.51 L) | NR | 0.5 to 0.8 L | 0.27 to 0.4 kg |
| | **Express TNG Agral 90 (4 g/ac + 0.35 v/v)** | NR | NR | NR | 0.3 to 0.4 L | NR |
| | **Pardner( 0.51 L)** | 0.3 to 0.4 L | 0.3 to 0.4 L*** †(0.2 to 0.27 L) | 0.3 to 0.4 L | 0.3 to 0.4 L | 0.16 to 0.21 kg |
| | **MCPA<br>(0.2 to 0.4 L)*** | 0.5 to 0.8 L | 0.5 to 0.8 L †(0.34 to 0.51 L) | NR | 0.5 to 0.8 L | 0.27 to 0.4 kg |
| | **Buctril M<br>(0.2 to 0.4 L)*** | 0.5 to 0.8 L | 0.5 to 0.8 L †(0.34 to 0.51 L) | NR | 0.3 to 0.4 L | 0.27 to 0.4 kg |
| *Preseeding corn & flax:* | **MCPA◊◊<br>(0.2 to 0.4 L)*** | 0.5 to 0.8 L | 0.5 to 0.8 L<br>†(0.34 to 0.51 L) | NR | 0.5 to 0.8 L | 0.27 to 0.4 kg |
| | **Buctril M<br>(0.2 to 0.4 L)*** | 0.5 to 0.8 L | 0.5 to 0.8 L<br>†(0.34 to 0.51 L) | NR | 0.3 to 0.4 L | 0.27 to 0.4 kg |
| *Preseeding lentil & chickpea:* | **MCPA Amine◊◊<br>(0.2 to 0.28 L)*** | NR | 0.5 to 0.8 L<br>†(0.34 to 0.51 L) | NR | 0.5 to 0.8 L | 0.27 to 0.4 kg |
| *Preseeding field pea:* | **MCPA Amine◊◊<br>(0.2 to 0.28 L)*** | 0.5 to 0.8 L | 0.5 to 0.8 L<br>†(0.34 to 0.51 L) | NR | 0.5 to 0.8 L | 0.27 to 0.4 kg |
| *Preseeding canaryseed & seedling forage grasses*:* | **Buctril M<br>(0.2 to 0.4 L)*** | 0.5 to 0.8 L | 0.5 to 0.8 L<br>†(0.34 to 0.51 L) | NR | 0.3 to 0.4 L | 0.27 to 0.4 kg |
| *Chem fallow:* | **2,4-D◊ (0.5 L)*** | 0.3 to 0.4 L | 0.3 to 0.4 L †(0.2 to 0.27 L) | 0.3 to 0.4 L | 0.3 to 0.4 L | 0.16 to 0.21 kg |
| | **Dicamba (0.12 L)*** | 0.3 to 0.4 L | 0.3 to 0.4 L †(0.2 to 0.27 L) | 0.3 to 0.4 L | 0.3 to 0.4 L | 0.16 to 0.21 kg |
| | **Express TNG (4g)** | NR | NR | NR | 0.5 L | NR |
| | **Pardner (0.51 L)** | 0.3 to 0.4 L | 0.3 to 0.4 L*** †(0.2 to 0.27 L) | 0.3 to 0.4 L | 0.3 to 0.4 L | 0.16 to 0.21 kg |
| *Canada thistle control in stubble or fallow:* | **Dicamba<br>(0.51 L)**** | 0.69 L | 0.69 L †(0.46L) | 0.69 L | 0.69 L | 0.36 kg |
| *Alfalfa control in spring / fall:* | **2,4-D◊<br>(0.50 to 1.0 L)*** | 1.0 to 2.0 L | 1.0 to 2.0 L<br>†(0.67 to 1.34 L) | 1.0 to 2.0 L | 1.0 to 2.0 L | 0.53 to 1.1 kg |

* Roundup Ready (RR) canola control: Tank mixes of 2,4-D* at 0.23 to 0.34 L/acre, MCPA and Buctril M will control volunteer RR canola up to the 4 leaf stage and 2,4-D at 0.45 to 0.68 L/acre will give control up to the 6 leaf stage. Earlier application will result in more consistent control. Dicamba at 0.12 L/acre will not control RR canola.

** See recropping restrictions for Dicamba with fall applications.

*** Roundup Transorb registered for 0.4 L/acre rate of glyphosate only with Pardner tank mixes.

◊ Rates based on 500 g/L formulations. All formulations are registered for tank mixes.

◊◊ Use only amine formulations of MCPA prior to corn lentil, chickpea and field peas

* Forage grasses include brome grass, crested wheatgrass, intermediate wheat grass, slender wheatgrass, tall wheatgrass, Russian wild rye, Timothy, Orchard grass, creeping red fescue, meadow fescue, meadow foxtail, tall fescue, meadow bromegrass, streambank wheatgrass and reed canary grass.

** 2,4-D tankmixes in cereals are registered for winter wheat, wheat, barley and rye; Pardner tank-mixes in cereals are registered on wheat oats and barley; Buctril M and MCPA tank-mixes registered on cereals include wheat, barley, oat and rye; and Express Toss n Go tank-mixes include wheat, durum and barley.

† Renegade HC, Roundup Ultra, and Roundup WeatherMax rates given in brackets.

**Note: The above mixes are those listed on the glyphosate labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

## Application Information:

**Water Volume:** Do not use 'hard' or dirty water or weed control may be reduced.

Using clean water at 23-45 L per acre will provide acceptable weed control in most situations; use of the lower volume will improve control.

Refer to specific weed control situations or labels for more information on water volumes and adjuvants.

**Pressure:** 30 to 40 psi (200 to 275 kPa)

**Nozzles:** Flat fan

## How it Works:

Refer to table 2 on page 29.

## Effects of Growing Conditions:

Best results are achieved when temperatures are near 20°C and when weeds are actively growing. Frost which kills more than 40% of the above ground tissue will reduce control. Control will also be reduced if foliage is heavily covered with dust.

## Restrictions:

**Rainfall:** Do not apply if rainfall is forecast for the time of application, as weed control may be reduced. Consult manufacturer for more information.

**Grazing Interval:** Only grain and forages treated with Touchdown iQ may be fed to livestock. All portions of forage and crops treated with other products may be fed to livestock.

**Recropping Interval:** No restrictions.

**Aerial application:** Glyfos, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage and Vantage Plus, are now registered for aerial application of preharvest treatments only to all registered preharvest crops (not grown for seed) excluding forages. Do not apply any other brands of glyphosate by air. Consult manufacturer for current aerial preharvest registration status.

**Storage:** May be stored below 0° C.

**Equipment:** Do not mix, store or apply this product in galvanized steel or unlined steel (except stainless steel) containers or spraytanks.

**Environment:** Glyphosate is very toxic to non-target plants.

***Ground applications*** - maintain a 15 m buffer zone from the downwind edge of the spray boom to non-target areas to minimize drift damage.

***Preharvest aerial applications*** - maintain a 25 m buffer zone from water and wetland areas, and a 55 m buffer from shelterbelts, woodlots and other cover on the edge of treated fields.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

☠ Caution Poison (Roundup WeatherMax)

Warning Eye and Skin Irritant (Roundup Dry, Roundup WeatherMax)

Danger Eye and Skin Irritant (Roundup Ultra)

Danger Corrosive to eyes (Roundup Dry)

Caution Skin and Eye Irritant (all other products)

# Gramoxone

**Herbicide Group – 22**
*(Refer to page 27)*

## Company:

Syngenta (PCP#8661)

## Formulation:

200 g/L paraquat. Container size - 5 L, 20 L.

## Crops and Staging:

Stale seedbed - Non-selective weed control applied 3 days prior to crop emergence in beans, corn, potatoes, peas, soybeans.

Non-selective weed control applied as a directed spray between rows in row crops. Avoid contact with crop foliage.

Control of weed seedlings in established alfalfa and bird's-foot trefoil for hay - apply 5 days after first cut.

Control of weed seedlings in bird's-foot trefoil for seed - apply in spring when bird's-foot trefoil shoots are 3 to 6 inches (7.5 to 15 cm) long.

Non-selective weed control applied as a directed spray in and around shelterbelt trees or woodlot plantings. Avoid contact with foliage.

Pre or Post seeding burndown (prior to crop emergence) in barley, canary seed, canola, corn (field, sweet and pop), dry beans, field peas, flax (including low linolenic types), lentils, mustard, oats, potato, rye, soybean, sunflower, triticale, wheat.

## Weeds and Staging:

Annual weed burn-off. Best control when weeds are less than 2 inches (5 cm) in height or diameter.

## Cost (2005 suggested retail price):

$25.55 to $51.10 per acre.

## Rates:

**Pre or post seeding burndown:** 0.8 to 1.6 L/acre

**All other applications:** If weeds are less than 2 inches (5 cm) in height, apply 1.1 L per acre (5 L treats 4.5 acres). If weeds are taller than 2 inches (5 cm), increase the rate of Gramoxone to 2.2 L per acre (5 L treats 2.2 acres).

## Application Information:

**Water Volumes:**
***Pre or post seeding burndown:*** at least 40 liters per acre.
***All other applications:*** 135 to 500 L per acre. Use the higher water volumes within the range if weed growth is dense.

Good coverage is critical for good control.
**Pressure:** 30 to 40 psi (200 to 275 kPa).
**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Best results on cloudy days or just prior to darkness.

## Tank Mixes:

***Corn:*** Aatrex, Dual II Magnum, Frontier and Primextra II Magnum*
***Soybean:*** Dual II Magnum, Sencor, Lorox, Linuron, Sencor, Pursuit*
* Refer to product labels for time of application and restrictions.

## Restrictions:

**Rainfall:** Within 1 hour will reduce weed control.

**Grazing:** Do not graze or harvest treated foliage. Regrowth from treated alfalfa or bird's-foot trefoil may be fed to livestock.

**Recropping Interval:** No restrictions

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze.

**Environment:** Maintain a buffer zone of 15 m between the downwind edge of the spray boom and non-target plants and 45 m for wetland areas. Do not spray when conditions are dead clam or when wind is gusty or blowing faster than 16 km/hr.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Danger - Poison (may be fatal if swallowed)

Danger – Corrosive to eyes

**Re-entry Period:** Do not re-enter treated fields for 24 hours following application. If necessary, workers may re-enter field after 4 hours if wearing protective clothing. See label for details.

# Grazon

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

Dow AgroSciences (PCP#26649)

## Formulation:

65 g/L picloram + 240 g/L 2,4-D formulated as a solution.

Container size – 2 x 10 L.

Note: Available only through selected retail outlets.

## Crops and Staging:

Permanent grass pasture and rangeland. Apply in spring or early summer.

## Weeds, Rates and Staging:

**Broadleaf weeds:**

***Apply at 1.5 L/acre:***

Canada thistle
Dandelion
Common Yarrow

***Apply at 2.8 L per acre:***

Burdock
Clovers (red, sweet)
Common ragweed
Dock
Fleabane
Goldenrod
Plantain
Prickly lettuce
Vetch
Wild carrot

**Woody plants:**

***Apply at 7.3 to 10.1 L per acre by ground and 10.1 to 14.2 L per acre by air:***

Alder
Aspen◊
Birch
Cedar (red cedar*)
Cherry◊
Locust◊
Maple*
Oak*◊
Pine*
Poplar
Spruce*
Sumac ◊
Willow◊

◊ Aerial application only
* High rate by air when species growing on heavy clay soils.
Use an approved drift control additive or system.

## Cost (2005 suggested retail price):

$14.25 per L.

## Application Information:

**Water volume:**
***Ground application:*** 80 L per acre.
***Aerial application:*** 60 L per acre

**Pressure:** Use pressures that will give the lowest amount of drift while maintaining good pattern and coverage.

**Nozzles:** Use an approved drift control system that produces coarse droplets in a uniform pattern.

Drift of even small amounts of Grazon into sensitive plants or areas where sensitive crops may be grown can cause injury. Do not apply under conditions prone to drift (i.e. high winds and temperature inversions).

## How it Works:

Refer to table 2 on page 29.

**IMPORTANT: Picloram is a very persistent and water-soluble herbicide. Treated soil should not be moved from the treated area. Do not apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. Do not apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. When applying Grazon over sandy soils ensure that aquifers are not within 1.8 m of the soil surface. If shallow aquifers are present, do not apply Grazon. Grazon must not be applied on range and pasture acres that are irrigated. Do no compost or mulch clippings or manure from grass treated with Grazon unless being reapplied to the treated area.**

## Effects of Growing Conditions:

Nothing listed on label.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** Do not apply if rainfall is forecast.

**Grazing:** Do not allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest forage or cut hay within 30 days of application. **See restrictions in "How it Works" section above.**

**Recropping:** Legumes may not be established in a pasture for several years after treatment. If legumes are essential in a pasture, do not use Grazon. Do not break up treated pasture and plant to sensitive broadleaf crops for at least 5 years after application of Grazon.

**Storage:** Store product in original containers in a secure, dry, cool area. Do not freeze.

**Environment:** This product is moderately toxic to fish. Apply this product well back from any water bodies to avoid contamination. Heavy rains can move this product from its application site down slope toward sensitive areas. Do not load or mix near wells, dugouts or other water bodies. Contact the provincial environment department for permits to apply near water.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

☠ Caution Poison

May cause skin and eye irritation

# Harmony Total

**Herbicide Group – 1, 2**
*(Refer to page 27)*

**This product is a prepackaged tank mix of Refine Extra (page 180) and Horizon (page 136). Information listed is restricted to Crop, Weeds, Rates, Cost and Tank mixes. For other detailed information on the component products see the product pages listed above.**

## Company:

E. I. duPont Canada

## Formulation:

**Refine Extra (PCP#22575):** 50% thifensulfuron methyl + 25% tribenuron methyl; formulated as a water dispersible granule.
Container size: 4 x 80 g water soluble pouches (320 g total).

**Horizon WO (PCP#25477):** 240g/ L clodinafop-propargyl formulated as an emulsifiable concentrate.
Container size: 1 x 3.68 L

**Score Adjuvant (PCP#25476):** Container size - 2 x 6.4 L

## Crops and Staging:

Spring wheat (including durum) Prior to the emergence of the 4th tiller.

## Weeds and Staging:

**Grass Weeds:**
Wild oat -1 to 6 leaves up to the emergence of the 4th tiller.
Green foxtail -1 to 5 leaves up to the emergence of the 3rd tiller.

**Broadleaf Weeds:**
Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

***Controlled:***

Ball mustard
Chickweed (1 to 6 leaf)
Common groundsel
Corn spurry
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia (Group 2 resistant biotypes with Banvell II tankmix only)
Lady's-thumb
Lamb's-quarters
Narrow-leaved hawk's beard
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola (CLEARFIELD canola only with MCPA Ester tank mix)
Volunteer sunflowers
Wild buckwheat (1 to 3 leaf)
Wild mustard

***Suppressed:***

Cleavers - 1 to 3 whorls
Stork's-bill, round-leaved mallow - 2 to 6 leaves
Canada thistle, perennial sow-thistle - under 6" (15 cm) tall, prior to budding
Scentless chamomile
Toadflax - less than 6" (15 cm) tall

For optimum control apply before the annual grasses tiller. Harmony Total will also control or suppress the broadleaf weeds listed for Refine Extra alone at 8 g/acre.

## Cost (2005 suggested retail price):

$23.80 per acre.

## Rates:

Refine Extra - 8 g/acre
Horizon WO - 93 mL/acre
Score adjuvant - 0.8 L per 100 L of spray solution
One case treats 40 acres (16 ha)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 psi (275 kpa ).

**Nozzles:** Flat fan nozzles with 50 mesh line strainers and screens.

## Tank Mixes:

Do not tank mix with substances that contain boron or that release chlorine.

**Herbicides:**

MCPA Ester (0.38 to 0.45 L/acre of 500 g/L formulation).
Banvel II (44.5 mL/acre). Not for use in durum.

# Horizon

## Herbicide Group – 1

*(Refer to page 27)*

## Company:

Syngenta

## Formulation:

**Horizon (PCP#24076):** 240 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.
Container size – 3.68 L.

**Score adjuvant (PCP#20475):** 2 x 6.4 L.

## Crops and Staging:

Spring wheat (including durum) - prior to the emergence of the 4th tiller.

When tank mixing, check broadleaf product description for additional restrictions.

## Weeds, Rates and Staging:

**Apply at 95 mL per acre (40 acres per case) for:**

| WEED | STAGE |
|---|---|
| Barnyard grass | 1 to 5 leaf prior to tillering |
| Green and yellow foxtail | 1 to 5 leaf stage, prior to emergence of 3rd tiller |
| Volunteer canaryseed, wild oats | 1 to 6 leaf, maximum 3 tillers |
| Volunteer oats | 3 to 6 leaf, maximum 3 tillers |

**Apply at 115 mL per acre (32 acres per case) to control the above weeds plus**

| WEED | STAGE |
|---|---|
| Persian darnel | 1 to 5 leaf prior to tillering |

**Apply at the 2 to 3 leaf stage for optimum control.**

Optimum weed control and yield response occurs when weeds are controlled before tillering.

Add Score adjuvant at a rate of 1 L per 100 L spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

$17.61 to $22.01 per acre.

## Application Information:

**Water Volume:**
***Ground:*** 20 to 40 L per acre.
***Aerial:*** 12 L/acre

**Pressure:** 40 to 45 psi (275 to 310 kPa).

**Nozzles:** 80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

For optimum results, apply to actively growing weeds. Do not apply to crops or weeds that are stressed by hot or cool conditions, frost, drought, low fertility, water-saturated soil, disease or insect damage as crop injury and poor weed control may result.

## Tank Mixes:

Mixes provide control of wild oat, green foxtail, and weeds/insects controlled by the tank mix partner unless otherwise noted.

**Herbicides:**

***In spring wheat (including durum except where indicated):***

2,4-D amine (0.34 to 0.45 L/acre)
Ally (3 g/acre)
Attain (40 acres/case)
Bromoxynil+MCPA (Buctril M*** or Mextrol only) (label rates)
Curtail M (0.81 L/acre)
Dichlorprop + 2,4-D (0.71 L/acre)**
DyVel (0.50 L/acre)
Lontrel (0.17 to 0.34 L/acre)
Lontrel (0.11 to 0.17 L/acre) + MCPA ester (0.45 L/acre)
Lontrel (85 mL/acre) + Refine Extra (8 g/acre)
MCPA amine or ester (0.34 to 0.45 L/acre)
MCPA Sodium Salt (0.48 to 1.09 L/acre)*
Pardner (0.40 L/acre)
Prestige (20 acres/case)
Refine Extra (8 g/acre)
Target (0.4 to 0.6 L/acre)**
Thumper (0.40 L/acre)
Trophy (20 acres per case)
Unity (40 acres/case)

* Rate above 0.81 L/acre may cause crop injury.
** Barnyard grass also controlled
*** Barnyard grass and Persian darnel also controlled

Refer to the broadleaf herbicide label for crop staging, and other information. When tank mixing, always add the broadleaf herbicide first, followed by Horizon, with the Score adjuvant added last. Reductions in green foxtail and wild oat control may be observed when tank mixed with 2,4-D amine and MCPA amine.

**Fertilizers:** None registered.

**Insecticides:** Horizon can be tank mixed with:
Decis 5F (32 to 48 mL/acre).
Matador (25 to 33 mL/acre).

**Fungicides:** Tilt (0.2 L/acre)

**Note: The above mixes are those listed on the Horizon label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Rainfall within 30 minutes may reduce control.

**Grazing:** Do not graze or harvest treated crops for forage within 3 days of application.

**Preharvest:** Leave at least 60 days from application to harvest.

**Recropping:** No restrictions.

**Storage:** May be frozen.

**Aerial Application:** May be applied by air.

**Environment:** Do not apply within 15 m of rivers, lakes, ponds, wetlands, sloughs, irrigation water, vegetated ditch banks, or water used for livestock or domestic purposes.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

Warning Eye and Skin Irritant

# Horizon BTM

**Herbicide Group – 1, 4, 6**
*(Refer to page 27)*

**This product is a prepackaged tank mix of Horizon (page 136) and Mextrol 450 (page 81). Information listed is restricted to Crop, Weeds, Rates and Cost. For other detailed information on the component products see the product pages listed above.**

## Company:

Syngenta

## Formulation:

*The Horizon BTM package has three components:*

**Horizon 240 EC (PCP#25477):** 240 g/L clodinafop - propargyl formulated as an emulsifiable concentrate. Container size - 1.84 L

**Mextrol 450 (PCP#26999):** 225 g/L bromoxynil and 225 g/L MCPA ester formulated as an emulsifiable concentrate. Container size -10.2 L

**Score (PCP#25476).** Container size: 6.4 L

Each case treats 20 acres.

## Crops and Staging:

Spring wheat (including durum) from the 2 leaf stage up to the emergence of 4th tiller.

## Weeds and Staging:

**Grass Weeds:**

| | |
|---|---|
| Wild oat | 1 to 6 leaves to the emergence of the 4th tiller |
| Green foxtail | 1 to 5 leaves to the emergence of the 3rd tiller. |

**Broadleaf Weeds:**

***Weeds controlled up to 4 leaf stage:***

American nightshade
Bluebur
Ball mustard
Cocklebur
Cow cockle
Flixweed
Green smartweed
Kochia**
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed
Russian thistle**
Scentless chamomile***
Shepherd's-purse
Volunteer canola
Volunteer sunflower

** Control before plants are 2 inches tall.
*** Spring seedlings only.

***Weeds controlled up to 8 leaf stage:***

Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tame buckwheat
Tartary buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

***Weeds with top growth controlled:***

Canada thistle
Perennial sow-thistle

## Cost (2005 suggested retail price):

$23.64 per acre.

## Rates:

0.51 L/acre Mextrol 450
95 mL/acre Horizon
0.32 L/acre Horizon BTM adjuvant

One case treats 20 acres.

Add Mextrol 450 first, followed by Horizon 240 EC with the Horizon BTM adjuvant added last.

## Application Information:

**Water Volume:** 40 L per acre

# K2*

**Herbicide Group – 2**
*(Refer to page 27)*

**This product is a prepackaged tank mix of Everest (page 108) and Refine Extra (page 180). Information listed is restricted to Crop, Weeds, Rates and Cost. For other detailed information on the component products see the product pages listed above. *Note K2 will no longer be available following the 2006 growing season, as production of this product has been discontinued.**

## Company:

E. I. duPont Canada Inc.

## Formulation:

**Refine Extra (PCP#22575):** 50% thifensulfuron methyl plus 25% tribenuron methyl formulated as a dry flowable.
Container size: 4 water-soluble bags (80 g each, total 320 g).

**Everest (PCP#26448):** 66% flucarbazone-sodium formulated as a water dispersible granule.
Container size: 4 x 174 g water-soluble packets.

## Crops and Staging:

Spring wheat (NOT including durum) - Apply from 1 (expanded) to 4 main stem leaves up to two tillers*. Injury may result if applied outside the recommended stages.

* **Caution:** K2 MUST be applied in a mix with 2,4-D ester (not supplied) at 0.35 L to 0.45 L/acre (based on 500g/L formulation) plus 0.25% v/v of a recommended surfactant. See 2,4-D for additional staging and application restrictions. 2,4-D staging is 4 leaf to early flag leaf.

## Weeds and Staging:

**Grasses:**
Wild oats and green foxtail at the 1 to 6 leaf stage (4 leaves on the main stem plus 2 tillers)

**Broadleaves:**
Unless otherwise indicated, apply to young, actively growing broadleaf weeds that are up to 4 inches (10 cm) tall or wide.

***Weeds Controlled (when tank mixed with 2,4-D):***

Burdock (seedlings)
Chickweed
Cocklebur
Common ragweed
Common plantain
Common groundsel
Corn spurry
Cow cockle
False ragweed
Mustard (ball, hare's ear, Indian, tumble, wild, wormseed)
Narrow-leaved hawk's-beard
Pigweed (redroot, Russian)
Prickly lettuce
Russian thistle
Shepherd's-purse
Stinkweed
Flixweed
Giant ragweed
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Sweet clover
Tartary buckwheat
Volunteer canola
Volunteer sunflower
Wild Buckwheat
Wild radish

***Weeds Suppressed:***

Canada thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Cleavers (1 to 3 whorls)
Round-leaved mallow (2 to 6 leaf)
Scentless chamomile
Sow-thistle
Stork's-bill (2 to 6 leaf)
Toadflax (less than 15 cm tall)

## Cost (2005 suggested retail price):

$21.46 per acre not including cost of 2,4-D ester and adjuvant.

## Rates:

**Refine Extra:** 8 g per acre

**Everest:** 17.4 g per acre. (One case treats 40 acres)

**2,4-D ester (not supplied) must be mixed with K2 at 0.34 to 0.45 L/acre (based on 500g/ L formulation) for improved crop tolerance.**

Agral 90 or Ag-Surf at 0.25 L per 100L of spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application information:

**Water Volume:** 40 L per acre.

**Pressure:** 30 to 50 psi (200 to 345 kPa).

**Nozzles:** Flat Fan nozzles at 80° or 110°. Use of flood-jet or controlled droplet application equipment is not recommended.

## Tank Cleaning:

Both components of K2 can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray K2 should be flushed out immediately before using another product. Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.
2. Fill the tank with clean water and 1 L of 3% household ammonia per 100L of water. Flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.
3. All nozzles, screens and filters should be removed and cleaned after applying this product. Clean nozzles and screens in a separate container using the ammonia and water.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

For additional information on tank cleaning see page 14.

# Kerb 50-WSP

**Herbicide Group – 15**
*(Refer to page 27)*

## Company:

Dow AgroSciences (PCP#25595)

## Formulation:

50% propyzamide formulated as a wettable powder. Container size - 1.36 kg (3 x 454 g water soluble pouches).

## Crops and Staging:

Apply to the following established crops between October 1 and freeze-up or very early spring*:

Seedling and established alfalfa, bird's-foot trefoil, and established pastures**.

* Seed alfalfa only.

** Severe stand thinning may occur to pastures consisting primarily of crested wheatgrass, meadow fescue and timothy. Some thinning (10 to 15%) may occur with tall fescue and creeping red fescue.

## Weeds, Rates and Staging:

Apply in late fall or very early spring (seed alfalfa only) prior to the emergence of weeds.

**Established grass or grass/legume pastures for control of foxtail barley:**
Brown, dark brown or gray wooded soils - 0.36 kg/acre.
Black soils - 0.45 kg/acre.

**Alfalfa and bird's foot trefoil:**
Annual grasses, volunteer cereals, wild oat - 0.71 kg/acre.
Quackgrass, orchardgrass, timothy, chickweed - 0.91 to 1.32 kg/acre*.
Dodder control (fall application only) - 1.3 kg/acre. Note that complete control may not be achieved.

* Maximum 0.91 kg per acre with spring application. Low temperatures and adequate moisture following application are needed for efficacy.

**Caution:** Do not use on soils with more than 6% organic matter. Do not apply to soils prone to flooding. Do not apply to pastures that contain high proportions of timothy, crested wheat grass or meadow fescue. Consult the manufacturer for other forage grass species sensitivities to Kerb 50-WSP.

## Cost (2005 suggested retail price):

$83.69 per kg.

## Application Information:

**Water Volume:** 120 to 200 L per acre.
**Pressure:** 30 to 40 psi (200 to 275 kPa).
**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Dry soil conditions at time of weed emergence may result in reduced control. Approximately 3 inches of total precipitation is required for adequate activation. Best results when soil temperatures are low but above freezing.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** Surface applications are most effective if followed by 0.5 to 1 inch (1.25 to 2.5 cm) of rain within 2 days of application.

**Grazing:** Do not graze or harvest for livestock feed within 90 days of the 1.32 kg/acre rate and 60 days of application for lower rates.

**Recropping:** Do not replant to crops within 1 year of treatment.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool, dry place. Do not freeze

**Environment:** Do not contaminate domestic or natural water sources or wetlands.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

# Laddok

**Herbicide Groups – 5,6**
*(Refer to page 27)*

## Company:

BASF Canada (PCP#16641)

## Formulation:

200 g/L bentazon and 200 g/L atrazine formulated as a solution.
Container size - 10 L.

## Crops and Staging:

Corn (grain, silage and seed) at the 1 to 5 leaf stage. Seed corn producers should consult their seed corn company regarding the tolerance of seed production lines to Laddok and oil concentrates.

## Weeds, Staging and Rates:

Add Assist at 1.0 L per 100 L of spray solution.

| ANNUAL WEEDS | 1.21 L/ACRE |  | 1.62 L/ACRE |  |
|---|---|---|---|---|
|  | inches | (cm) | inches | (cm) |
| Black nightshade |  |  | 0.2 - 0.8 | (0.5 - 2.0) |
| Buttercup |  |  | 2 - 4 | (5 - 10) |
| Cocklebur | 3 - 7 | (7.5 - 17.5) | 7 - 12 | (17.5 - 30.0) |
| Common chickweed |  |  | Apply 1 to 3 weeks after emergence |  |
| Common groundsel |  |  | 2 - 4 | (5 - 10) |
| Common ragweed | 1 - 1.5 | (2.5 - 4.0) | 1.5 - 3 | (4.0 - 7.5) |
| Corn spurry |  |  | 1 - 4 | (2.5 - 10.0) |
| Giant ragweed |  |  | 2 - 6 | (5 - 15) |
| Hairy galinsoga |  |  | 2 - 3 | (5.0 - 7.5) |
| Lady's-thumb (smartweed) | 1 - 3 | (2.5 - 7.5) | 3 - 8 | (7.5 - 20.0) |
| Lamb's-quarters | 1 - 2 | (2.5 - 5.0) | 2 - 4 | (5 - 10) |
| Purslane |  |  | 1 - 2 | (2.5 - 5.0) |
| Redroot pigweed | 0.7 - 1.2 | (1.5 - 3.0) | 1.2 - 1.5 | (3 - 4) |
| Russian thistle |  |  | 1 - 3 | (2.5 - 7.5) |
| Venice mallow | 1 - 2 | (2.5 - 5.0) | 2 - 4 | (5 - 10) |
| Wild mustard | 1 - 5 | (2.5 - 12.5) | 5 - 10 | (12.5 - 25.0) |
| PERENNIAL WEEDS | Rate: 1.21 - 1.62 L/acre |  |  |  |
| Yellow nutsedge | 4 - 6 | (10 - 15) | (repeat 7 - 10 days if necessary) |  |

## Cost (2005 suggested retail price):

$16.09 to $21.55 per acre.

## Application Information:

**Water Volume:** 80 to 160 L per acre. The higher recommended water volumes and pressures should be used for dense weed infestations or for weeds approaching the upper limit of their recommended stage for treatment.

**Pressure:** 40 to 45 psi (275 to 300 kPa).

**Nozzles:** Flat fan nozzles capable of delivering high water volumes.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Crop injury may occur if applications are made when crop is under stress because of prolonged cold weather, poor fertility or other factors; or when corn is wet and succulent from recent rainfall.

Best weed control is under warm, humid conditions.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** Within 6 to 8 hours of application will reduce control.

**Grazing:** Do not graze the treated crop or cut for hay prior to crop maturity.

**Recropping:** No restrictions the year following treatment when label rates for annual weeds have been used. Use of the double application for yellow nutsedge control may cause injury to rotational crops because of carryover of the Atrazine component of the product. Under particularly dry soil conditions, there may be greater carryover of the atrazine component of Laddok that could damage a number of different special crops. Refer to the "Atrazine" product description for information.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze.

**Environment:** Avoid conditions that will risk drift to non-target plant, water sources or wetlands.

## Tank Cleaning:

The manufacturer does not provide information on tank cleaning.

Refer to Basagran and Atrazine recommendations and page 14.

## Hazard Rating:

Caution Poison

# Liberty

**Herbicide Group – 10**
*(Refer to page 27)*

## Company:

Bayer CropScience (PCP#26694)

## Formulation:

150 g/L glufosinate ammonium formulated as a solution. Container sizes - 13.5 L, 108 L.

## Crops and Staging:

Liberty Link Canola - cotyledon to early bolting stage. Temporary crop discolouration (bronzing) may be observed after application.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

**For Desiccation use only:**
Alfalfa (seed production only) - 50 to 75% pod turn (brown)
Lentils* - 40 to 60% pod turn (yellow to brown)
Potatoes* - 14 to 21 days prior to harvest.
*Not for crops grown for seed production.

## Weeds, Rates and Staging:

| WEED | WEED STAGE (from emergence to stage) | RATE (L/ACRE) | ACRES PER 13.5 L |
|---|---|---|---|
| Cow cockle | 4 leaf | 0.54 | 25 |
| Green foxtail | 6 leaf (max. 3 tillers) | | |
| Barnyard grass, volunteer canola | 4 leaf | 0.81 | 16.6 |
| Wild mustard | 5 leaf | | |
| Lamb's-quarters, smartweed (lady's-thumb) | 6 leaf | | |
| Stinkweed | 8 leaf | | |
| Volunteer flax | 2.5 inches (6 cm) | | |
| Russian thistle | 3 inches (8 cm) | | |
| Wild buckwheat | 3 leaf | 1.1 | 12.4 |
| Redroot pigweed, round-leaved mallow, quackgrass* | 4 leaf | | |
| Light to moderate infestations◆ of volunteer wheat, volunteer barley* | 4 leaf (max. 2 tillers) | | |
| Hemp-nettle (1 to 3 leaf pairs), shepherd's purse | 6 leaf | | |
| Common chickweed (max. 4 leaf pairs), Perennial sow-thistle | 8 leaf | | |
| Kochia | 3 inches (8 cm) | | |
| Canada thistle*, scentless chamomile | 4 inches (10 cm) | | |
| Cleavers | 2 whorls (nodes) | 1.35 | 10 |
| Stork's-bill and heavy populations of wild buckwheat | 3 leaf | | |
| Quackgrass (light to moderate** or heavy infestations*)◆, volunteer wheat, volunteer barley*, wild oat | 4 leaf (max. 2 tillers except quackgrass) | | |
| Hemp-nettle | 8 leaf (1 to 4 leaf pairs) | | |
| Dandelion rosettes | 6 in. (15 cm) across | | |
| Flixweed, Canada thistle* | 4 inches (10 cm) | | |
| Quackgrass*** | 4 leaf | 1.6 | 8.3 |
| Canada thistle** | 4 inches (10 cm) | | |

* Temporary top growth control. Plants may return from surviving growing points.

** Extended Top growth control.

*** Season long control

◆ The company does not provide guidelines for weed densities. When in doubt as to the infestation level, use the high rate or contact the manufacturer

A second application can be made to fields that were treated initially with up to 1.35 L/acre. Apply Liberty at a rate of 0.81 to 1.35 L/acre in the second application.

## Desiccation Rates:

Alfalfa (seed production only) - 1.09 L per acre
Lentil* - 0.81 to 1.09 L per acre
Potato* - 1.21 L per acre
* Not for crops grown for seed production.

## Cost (2005 suggested retail price):

$14.04 per L.

## Application Information:

**Water Volume:**

*Ground applications:* 45 L per acre.
*Aerial applications:*
In Liberty Link canola use 22 L per acre.
For desiccation, 13 to 22 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:**

*Ground Application:* 80° or 110° stainless steel flat fan nozzles tilted forward at an angle of 45°.
*Aerial applications:* Do not use raindrop nozzles. Use a combination of nozzles and pressure to provide a coarse droplet size distribution (mean diameter of 350 microns).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Liberty activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought, and low humidity conditions slow weed growth. Applications made under these stressed conditions may result in reduced weed control.

## Tank Mixes:

**Herbicides:**

***For enhanced control of wild out and volunteer barley, in Liberty Link canola Liberty at 1.1 -1.35 L/acre mixed with:***

Clethodim (25.5 mL/acre)

Fusion (40 acres per case)

Consult Liberty label for exact weed control options. For Clethodim tank mix add Amigo to the tank first at 0.5 L per 100 L spray solution followed by Liberty and then tank mix partner. Consult label for specific mixing instructions.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Liberty label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 4 hours may reduce control.

**Grazing:** Do not graze the treated crop or cut for feed.

**Preharvest Interval:** Do not harvest desiccated potato or lentil crops within 9 days of treatment.

**Recropping:** No restrictions.

**Aerial Application:** May be applied by air.

**Storage:** Do not freeze.

**Environment:** Do not apply within 15 m of environmentally sensitive areas using ground equipment or within 30 m of environmentally sensitive areas when applying by air. Do not apply when dead calm or when winds exceed 16 km/hr applying using unprotected booms or by air, or exceeding 25 km/hr using shrouded booms.

## Tank Cleaning:

Refer to tank cleaning section on page 14.

## Hazard Rating:

◈ Warning Poison

Skin and Eye Irritant

# Liberty 200 SN

**Herbicide Group – 10**
*(Refer to page 27)*

## Company:

Bayer CropScience (PCP#25337)

## Formulation:

200 g/L of glufosinate ammonium formulated as a solution

Container sizes- 10 L

One case treats 20 acres

## Crops and Staging:

For use on LIBERTY 200SN tolerant Corn only. Apply from 1-8 leaf stage of the crop, refer to product label for appropriate method of determining crop leaf stage.

## Weeds Rates and Staging:

**Weeds controlled with 0.61 L per acre rate**

| WEED | WEED STAGE (from emergence to stage) |
|---|---|
| Green foxtail | 5 leaf |
| Proso millet | 5 leaf |
| Chickweed | 8 leaf |
| Cocklebur | 4 leaf |
| Ragweed | 5 leaf |
| Redroot pigweed | 6 leaf |
| Shepherd's purse | 6 leaf |

**Weeds controlled with 0.81 L per acre rate**

| WEED | WEED STAGE (from emergence to stage) |
|---|---|
| Barnyard grass | 5 leaf |
| Wild oat | 4 leaf |
| Yellow foxtail | 4 leaf |
| Eastern black nightshade | 5 leaf |
| Lady's thumb | 6 leaf |
| Lamb's quarters | 6 leaf |
| Perennial sowthistle | 4 leaf |
| Ragweed | 7 leaf |
| Stinkweed | 8 leaf |
| Wild buckwheat | 4 leaf |
| Wild mustard | 4 leaf |
| Wormseed mustard | 6 leaf |
| Field bindweed* | 6 leaf |
| Canada thistle* | 6 leaf |

* season long suppression

**Weeds controlled with 1.0 L per acre rate**

| WEED | WEED STAGE (from emergence to stage) |
|---|---|
| Quackgrass ** | 4 leaf |

** season long suppression, apply with ammonium sulphate, 2.4 L/acre (49% solution) or 1.2 kg/acre (99%).

**Second Application:**
A second application of LIBERTY 200SN may be made to fields treated initially with up to 1 L/acre, if weeds are present. Apply when new weed growth is in the correct leaf staging, and before maximum allowable leaf staging for crop. Do not apply more than 1.8 L/acre LIBERTY 200SN to a crop in a single season.

**Split Application Program:**
For season long control of the above listed weeds a split application of Liberty 200SN may be employed. The first application must be a minimum of 0.81 L/acre LIBERTY 200SN made at the correct weed staging. For the second application of LIBERTY 200SN a 0.51 L/acre rate may be used. The second application timing must be made as soon as the second flush of weeds occurs and before the maximum leaf stage for the crop.

## Cost: (2005 suggested retail price)

$16.71 to $27.40 per acre.

## Application Information:

**Water Volume:** A minimum of 45 L per acre

**Pressure:** 175 to 275 kPa (25 to 40 psi)

**Speed:** 6 to 10 km/h

**Nozzles:** 80° or 110° flat fan nozzles tilted forward at an angle of 45°.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Liberty 200SN activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought and low humidity conditions slow weed growth. Applications made under these stress conditions may result in reduced weed control.

Weed control may also be reduced when heavy dew, fog, or mist are present at the time of application.

## Tank Mixes:

None registered.

## Restrictions:

For sale and use in Manitoba on glufosinate-ammonium tolerant field corn.

**Rainfall:** Rainfall within 4 hours of application may reduce weed control

**Grazing:** Do not graze treated fields within 20 days of application.

**Pre-harvest Interval:** Do not apply within 86 days of harvesting corn grain.

**Recropping:** No recropping restrictions the year after treatment.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze.

**Environmental:** Do not contaminate water supplies, ponds, lakes, streams, and irrigation ditches by direct applications, spray drift, or when cleaning and rinsing spray equipment or containers. Leave a 15 meter buffer between the edge of the treated field and adjacent crops not tolerant to LIBERTY 200SN or environmentally sensitive areas (e.g. wetlands, ponds, rivers, or other open bodies of water, shelter belts or wildlife habitat).

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

Warning Eye and Skin Irritant

# Linuron

**Herbicide Group – 7**
*(Refer to page 27)*

## Company/Products:

E. I. duPont Canada (Lorox DF – PCP#20193, Lorox L – PCP#16279)

United Agri Products (Linuron 400 – PCP#15544)

The following recommendations are a blend of recommendations of all Linuron products. Consult the individual product labels for specific recommendations.

## Formulations:

**Linuron 400:** 400 g/L linuron formulated as a flowable. Container size - 10 L.

**Lorox L:** 480 g/L linuron formulated as a flowable. Container size - 10 L.

**Lorox DF:** 50% linuron formulated as a dry flowable. Container size - 10 kg).

*Linuron 400 may be in short supply in the distribution system for 2006 but is expected to be produced in the future.

## Crops, Rates and Stages:

**Post-emergent applications only:**

| CROP | STAGE | LINURON 400 (L/acre) | LOROX L (L/acre) | LOROX DF (kg/acre) |
|---|---|---|---|---|
| Spring wheat (including durum), oats and barley* | 2 to 4 leaf stage | 0.20 - 0.26 | 0.17 - 0.22 | 0.17 - 0.22 |
| Field corn (post-emergent** directed spray, do not spray over top of corn) | Apply when corn is at least 15 inches (38 cm) high (highest leaf on free standing plant) | 1.16 - 2.18 | 0.97 - 1.82 | 0.93 - 1.74 |
| Shelterbelts (caragana, green ash, Siberian and American elm, Manitoba maple, poplar, willow, white spruce, Colorado spruce, Scots pine) | Apply as an overall spray to dormant stock or as a directed spray if buds have broken. | 2.18 | 1.82 | 1.7 |

* Only when tank mixed with MCPA amine at 0.34 to 0.45 L/acre (500 formulation) or 0.4 to 0.57 L/acre MCPA K (400 formulation).

** Use lower rate when weeds do not exceed 2 inches (5 cm) and higher rate for weeds up to 8 inches (20 cm) in height, preferably before they are 5 inches (13 cm) high. Requires the addition of a mineral oil surfactant blend at 1 to 2 L per 100 L or spray solution or spray oil at 1 to 2 L per 10 L of spray solution. See oil labels for directions. DO NOT apply if linuron has been applied pre-emergent.

**Pre-emergent surface applications for use on loam to clay soils only:**

| PRODUCT | LINURON 400 (L/acre) | | LOROX L (L/acre) | | LOROX DF (kg/acre) | |
|---|---|---|---|---|---|---|
| Soil organic matter | less than 2% | from 2 - 5% | less than 2% | from 2 - 5% | less than 2% | from 2 - 5% |
| Field corn | 1.09* | 1.58 | 0.91* | 1.31* | 0.30* | 0.61* |
| Soybeans | 1.09 - 1.58 | 1.58 - 2.18 | 0.91 - 1.31 | 1.31 - 1.82 | 0.91 - 1.31 | 1.31 - 1.82 |
| Sweet white lupins | 1.01 | 1.50 | 0.85 | 1.25 | 0.81 | 1.21 |
| Potatoes | 1.11 - 1.72 | 1.72 - 2.22 | 0.91 | 1.82 | 0.89 | 1.74 |

* Must be tank mixed. Refer to specific labels for registered tankmix partners.

If used on sandy soils, severe crop injury may result.

Seed the crop at least 2 inches (5 cm) deep. Make only one application per year to field crops.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

**Banded Applications:**

This product may also be applied in a narrow band directly over the row in wide rowed crops if another method is to be used for weed control in between the rows. For band treatment, use proportionately less; for example, for 10 inch band on 30 inch row, use 1/3 of the broadcast rate.

## Weeds and Staging:

**Post-Emergence**

***When tank mixed with MCPA amine in cereals, the following weeds are controlled:***

Chickweed
Corn spurry
Cow cockle
Flixweed
Green foxtail
  (suppression possible)
Green smartweed
Hemp-nettle
Lady's-thumb
Lamb's-quarters
Ragweed (common, giant)
Redroot pigweed
Shepherd's-purse
Stinkweed
Stork's-bill
Tartary buckwheat
Wild buckwheat

Apply when annual broadleaf weeds are in the 2 to 4 leaf stage and when green foxtail is in the 1 to 3 leaf stage.

In shelterbelts, apply when weeds are less than 4 inches (10 cm) tall.

***Pre-emergent surface treatments and Post-emergent applications in corn and shelterbelts:***
Sufficient moisture (1 to 2 inches or 3 to 5 cm) in the form of rainfall or irrigation is necessary within 7 to 10 days of a pre-emergence application or poor weed control will result.

Barnyard grass*
Common chickweed
Common groundsel■
Corn spurry■
Crabgrass*
Dandelion (seedlings only)■
Foxtail (green and yellow)*
Goosefoot
Knotweed
Kochia■
Lamb's-quarters
Pigweed (prostrate■,
  redroot)
Plantain (seedlings only)■
Purslane
Ragweed (common)
Shepherd's-purse
Smartweed (annual)
Sow-thistle (annual,
perennial■ seedlings only)
Stinkweed°
Wild buckwheat
Wild radish■
Witchgrass
Wormseed mustard

* partial control
■ Not registered with Lorox products.
° Not registered with Linuron 400.

## Costs (2005 suggested retail prices):

Lorox DF - $33.38 per kg
Lorox L - $26.50 per L
Linuron 400 - $26.50 per L

## Application Information:

**Water Volume:**
*Post-emergent:* Cereals - 40 L per acre.
Field Corn directed spray – 69 to 138 L per acre.
*Pre-emergent surface:* 81 to 162 L per acre.
*Shelterbelts:* 90 to 180 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Stainless steel, flat fan nozzles with 50-mesh (or coarser) line strainers and screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

In post-emergent applications the best weed control occurs when temperatures are moderate, when relative humidity is high and when soil moisture is adequate. Injury to cereals (crop lightening) will occur when the crop is under stress because of drought or disease. This injury is worse when the product is applied at advanced leaf stages. In pre-emergent surface treatments, rainfall or irrigation (1 to 2 inches or 3 to 5 cm) is required to move linuron into the root zone of germinating seeds. Insufficient moisture will result in poor weed control. Drought conditions after application will result in little to no weed control. If rainfall does not occur within 7 to 10 days of application and prior to crop emergence, a shallow rotary hoeing (0.75 to 1.5 inches/ 2 to 4 cm) should be made to mix the top layer of soil to help activation. Avoid covering treated ground with un-treated soil. If unusually heavy rain follows application, severe crop injury may result from herbicide in the root zone of the crop. Do not use on sandy soils or severe crop injury will result.

## Tank Mixes:

**Herbicides:**
*In Cereals:* For post-emergent applications in cereals, linuron must be tank mixed with MCPA amine or MCPA K. Do not tank mix with other herbicides.
*In Corn:* Atrazine, Duall II Magnum and Primnextra II Magnum. Not all linuron products have the same tank mix options, refer to specific labels.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note: The above mixes are those listed on the linuron labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Pre-emergent applications require rainfall for activation. Contact manufacturer for more information.

**Grazing:** Do not graze treated crops or cut for feed prior to crop maturity.

**Preharvest Interval:**
*Sweet Corn:* Do not harvest within 50 days of treatment.
*Field Corn:* Do not harvest within 60 days of treatment or until after tassle emergence.

**Recropping:** If the intended crop fails, fields treated with Pre-emergent surface applications of linuron, may be seeded back to corn, soybeans, sweet white lupins, or potatoes. Till the soil thoroughly before reseeding. No restrictions 1 year after treatment.

**Aerial Application:** Do not apply by air.

**Storage:** Do not store liquid Linuron formulations at temperatures below 5°C. Lorox L may be frozen

## Tank Cleaning:

Refer to page 14.

# Lontrel

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

Dow AgroSciences (PCP#23545)

## Formulation:

360 g/L clopyralid formulated as a solution.
Container size - 4.45 L.

## Crops Rates and Staging:

**Applications of 0.17 to 0.23 L/acre (26.2 to 19.3 acres/jug):**
Barley, spring wheat (NOT including durum), oat - 3 to flag leaf emergence stage.

**Applications of 0.23 to 0.34 L/acre (19.3 to 13.1 acres/jug):**
Flax, Solin (low linolenic acid flax) - 2 to 4 inches (5 to 10 cm) in height.

**Applications of 0.17 to 0.34 L/acre (26.2 to 13.1 acres/jug):**
Canola - 2 to 6 leaf stage.
Seedling forage grasses* - 2 to 4 leaf stage.
Established grasses* - at the shot blade stage, or in the fall after harvest or in early spring.
Seedling and established grasses* for forage and seed production include:

Altai wild ryegrass
Creeping red fescue
Crested wheatgrass
Intermediate wheatgrass
Kentucky bluegrass
Meadow fescue
Meadow foxtail
Orchardgrass
Reed canarygrass
Slender wheatgrass
Smooth bromegrass
Streambank wheatgrass
Tall fescue
Tall wheatgrass
 (for forage only)
Timothy
Russian wild ryegrass

**Applications of 0.34 L per acre (13.1 acres per jug):**
Summerfallow – Stage according to weeds.
Shelterbelts* containing villosa lilac, acute willow, Colorado spruce, white spruce, buffaloberry and chokecherry.*

_*NOTE: Since this use is registered under User Requested Minor Use Label Expansion program, the manufacturer assumes no responsibility for herbicide performance._ ***Users of this product for these uses do so at their own risk.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

The following weeds will be controlled from 0.23 to 0.34 L per acre when young and actively growing:

Alsike clover
Common groundsel
Perennial sow-thistle
 (top growth only)
Scentless chamomile
Wild buckwheat
Volunteer alfalfa - 2 to 20 inches (5 to 50 cm) in height.

**Canada thistle** - after all thistles have emerged and when the majority are in the rosette to pre-bud stage;

| | |
|---|---|
| 0.17 L/acre | Provides top growth control of Canada thistle for 6 to 8 weeks. |
| 0.23 L/acre | Provides season long control of Canada thistle. Not all root stalks will be killed and some regrowth may occur by the end of the growing season. |
| 0.34 L/acre | Provides season long control of Canada thistle with suppression into the following year. |

## Cost (2005 suggested retail price):

$25.19 to $50.38 per acre.

## Application Information:

**Water Volume:** 40 to 89 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to table 2 on page 29.

## Effects of Growing Conditions:

Poor control may occur under dry conditions. Injury to flax may occur when tank mixing with MCPA. To reduce the risk of crop injury, do not apply tank mixes if temperature exceeds 27°C.

## Tank Mixes:

**Herbicides:**

Lontrel applications following applications of products containing bromoxynil (Badge, Buctril M, Koril, Mextrol, Pardner, Thumper) should be delayed by 14 days to allow the Canada thistle to recover from leaf burn.

Recommended rates of Lontrel may be used for each crop unless otherwise indicated.

***In Canola:***
Poast Ultra plus Merge adjuvant.
Fusion (Lontrel at 0.23 L/acre)
Roundup Original* /Transorb* (Lontrel at 0.112 L/acre)
Odyssey** (Lontrel at 0.17 to 0.23 L/acre)
Select plus Amigo adjuvant (Lontrel at 0.17 to 0.34 L/acre)
Vantage*/Vantage Plus* (Lontrel at 0.112 L/acre)

* Roundup Ready varieties only
** CLEARFIELD varieties only

***In Flax:***
MCPA amine or ester - 0.34 to 0.45 L/acre
(Lontrel at 0.17 L/acre)
Poast Ultra plus Merge adjuvant.
Poast Ultra + MCPA Ester (rates as above)
Select plus Amigo adjuvant.

***In Spring wheat (NOT including durum) and barley:***
*Lontrel at 85 mL/acre for the following mixes:*
Refine Extra (8 g/acre) + 2,4-D (0.28 L/acre - 600g/L formulation) plus non-ionic surfactant.
Refine Extra (8 g/acre) + MCPA (0.34 L/acre - 500g/L formulation) plus non-ionic surfactant.
*Lontrel at 0.11 to 0.17 L/acre for the following mix:*
2,4-D or MCPA (amine or ester) at label rates

***In Oat:***
MCPA amine or ester (Lontrel at 0.11 to 0.17 L/acre)

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Lontrel label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions.

General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Crops or areas treated with this product may be grazed immediately following treatment.

**Recropping:** Lontrel residues in the soil may affect succeeding crops. The year after application, replant to wheat, barley, oats, rye, flax, forage grasses, mustard or canola.

Do not use manure from animals fed or bedded with Lontrel-treated straw except on fields that are to be sown to Lontrel-tolerant crops.

**Aerial Application:** Do not apply by air.

**Storage:** Store in heated storage. If product is frozen, bring to room temperature and agitate before use.

**Environment:** Avoid contamination of non-target land, water or irrigation ditches.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

# MCPA

**Herbicide Group – 4**
*(Refer to page 27)*

## Company, Formulation and Cost (2005 suggested retail prices):

| | Price per L (PCP number) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 500 Ester** | | 600 Ester** | | 500 Amine* | | 400 (K) Potassium salt* | | 300 (Na) Sodium salt* | |
| IPCO | $8.90 | (20307) | N/A | (27802) | $7.65 | (20308) | $7.45 | (20305) | $5.75 | (20306) |
| Nufarm Agriculture | $9.30 | (27054) | N/A | (27803) | $8.00 | (14730) | $7.05 | (17564) | $5.85 | (14718) |
| UAP | $9.49 | (22199) | N/A | (27804) | $8.49 | (9516) | $6.15 | (14188) | $6.47 | (9858) |

* formulated as a solution.
** formulated as an emulsifiable concentrate.

Crops, weeds and rates and other application details may differ with different product labels. Consult specific product labels for more information.

## Crops, Rates and Staging:

The maximum safe rates for various crops are given below. Higher rates used for harder to control weeds (see "Weeds, Rates and Staging") may cause crop injury. Application rates for individual products may vary from those listed. Refer to the label for product specific use rates. Rates greater than these for harder to control weeds may cause crop injury. When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

| CROP | STAGE | RATE (L/ACRE) | | | | |
|---|---|---|---|---|---|---|
| | | AMINE | ESTER 600 | ESTER 500 | K SALT | NA SALT |
| Wheat (spring and durum), barley | 3 leaf to early flag leaf. | 0.45 | 0.43 | 0.45 | 0.53 | 0.81 |
| Oats | 3 leaf to early flag | 0.45 | 0.36 | 0.45 | 0.53 | 0.81 |
| Spring rye | 2 leaf to early flag leaf. | 0.45 | 0.43 | 0.45 | NR | 0.81 |
| Flax (not Solin varieties) | 2 inches (5 cm) in height to prebud stage. Apply at 2 to 4 inches (5 to 10 cm) in height for maximum crop tolerance. | 0.4 | 0.28 | 0.34 | 0.65 | 0.71 |
| Winter wheat, fall rye | In spring, apply from the time growth commences until the early flag leaf stage. | 0.45 | 0.43 | 0.45 | NR | 0.81 |
| Corn | As a broadcast spray up to 6 - 7 in. (15 - 18 cm) tall or 6 leaf stage. Up to 3 weeks before tassling as a directed spray using drop nozzles. | 0.45 | NR | NR | NR | 0.71 |
| Peas | Vines 4 to 7 inches (10 to 18 cm) long. For short-statured, determinate flowering peas, apply at the early stages within this range. | 0.22* | NR | NR | NR | 0.36* |
| Cereals underseeded to alfalfa (not Flemish varieties) | Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage. | 0.23 | NR | NR | NR | 0.4 |

*Crops, Rates and Staging continued on next page.*

**Crops, Rates and Staging** *continued*

| CROP | STAGE | RATE (L/ACRE) | | | | |
|---|---|---|---|---|---|---|
| | | AMINE | ESTER 600 | ESTER 500 | K SALT | NA SALT |
| Underseeded alsike, ladino and red clover | Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage. | 0.28 | NR | NR | NR | 0.4 |
| Red Clover◆<br>Seedling (seed and forage)<br>Established◆ (seed only) | ***Seedlings:*** 1 - 3 trifoliate stage. Do not feed to livestock in the first year.<br>***Established:*** Apply at the breaking of dormancy in the spring up to 7.5 cm. | 0.23 | NR | NR | NR | NR |
| Grass pastures | Spring or fall. | 1.42 | 1.13 | 1.38 | NR | 2.8 |
| Seedling forage** grasses(not for seed) | Apply from the 3 leaf stage to the shot blade stage. | 0.45** | NR | NR | NR | NR |
| Established forage** grasses(not for seed) | Apply in the spring up to the shot blade stage or in the fall after harvest. | 0.45** | NR | NR | NR | NR |

**NR** = Not Registered

* The rates given are lower than the registered rates for peas. Less than the maximum label rates are recommended because of crop injury concerns.

** MCPA is NOT registered for use on forage grasses, any such use is entirely at the risk of the user.

◆ Nufarm Agriculture MCPA Amine only

## Formulation Characteristics:

| Formulation | Risk of Vapour Drift | Activity on Weeds | Risk of Crop Injury |
|---|---|---|---|
| LV Ester | Medium | Fast | Medium |
| Amine | Very Low | Medium | Low |
| Salts | Very Low | Slow | Very Low |

## Weeds, Rates and Staging:

Apply at lower rates when weeds are small (2 to 4 leaf stage) and actively growing. Higher rates are needed when weeds are larger, in heavy populations, or growing under stressful conditions (excessively cold, hot, dry or wet). Lower rates may be applied in late fall to control winter annual weeds.

*NOTE: The following rates are a general range for all products. Rate ranges for individual products may differ slightly. Consult the product label for specific rates for each application.*

+ Not controlled by MCPA K salt formulation
++ Not controlled by MCPA K or Na salt formulations

**Susceptible weeds:**

Amine and Ester 500 formulations - 0.28 to 0.45 L/acre
Ester 600 formulations - 0.24 to 0.36L/acre
K formulations – 0.61 to 0.71 L/ac
Na formulations – 0.5 to 0.81 L/ac

Burdock
Cocklebur
Flixweed (late fall applications or small seedlings)*
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Prickly lettuce+
Ragweed
Russian pigweed
Shepherd's purse*
Stinkweed*
Wild Radish
Wild Sunflower+

* Winter annual weeds

**Harder to control weeds:**

Amine & Ester 500 formulations – 0.45 to 0.71 L/acre
Ester 600 formulations - 0.42 to 0.61L/acre
K formulations – 0.71 to 0.81 L/acre
Na formulations –0.81 to 1.1 L/acre

Annual sow thistle+
Biennial wormwood+
Bluebur+
Common peppergrass+
Curled dock+
Flixweed (overwintered rosettes prior to bolting)+
Goat's-beard+
Goosefoot+
Hemp-nettle (suppression only)
Mustard (dog and tansy)+
Plantain+
Purslane+
Redroot pigweed+
Smartweed (annual)+
Tumble pigweed+

**Top growth control only (rates as for harder to control weeds):**

Blue lettuce+
Canada thistle
Dandelion++
Gumweed+
Field bindweed+
Hedge bindweed+
Hoary Cress+
Leafy spurge+
Perennial sow thistle+
Russian thistle++

## Application Information:

**Water Volumes:**

***Cereals, flax, pastures, forage grasses:*** 40 to 81 L per acre.
***Peas:*** Minimum 61 L per acre.
***Cereals Underseeded to Forage Legumes:*** 61 to 81 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Best weed control occurs when temperatures are above 21°C (daytime) or 10°C (night time) and humidity is above 70 percent. Do not apply if temperature exceeds 27°C. If applying to flax, injury and a delay in maturity may result from application under hot or humid conditions. Extremely hard water may reduce performance or cause problems in spraying the product.

## Tank Mixes:

**Herbicides:**

***In Wheat and barley:***
Avenge (500 ester only)
Banvel II (amine and K salt only)
Pardner (K salt only)
Linuron and Sencor (amine only)

***In Oats:***
Pardner (K salt only)
Linuron (amine only)

Not all brands are labelled for tank mixing. Check the product label prior to use for registered mixes and rates. Follow all precautions and restrictions on both labels.

**Fertilizers:** Liquid nitrogen (28-0-0) may be used in place of water as a carrier with certain amine formulations for application in spring to winter wheat or fall rye.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the MCPA labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours of MCPA Na salt or MCPA K salt, 4 hours of MCPA amine, or 2 hours of MCPA ester application will reduce control.

**Grazing:** Do not graze within 7 days of application.

**Recropping:** No restrictions the year after application.

**Aerial Application:** Some products may be applied by air to specific crops. Check the label for detailed instructions.

**Storage:** MCPA ester may be frozen. Do not freeze MCPA amine, MCPA sodium salt and MCPA K.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

☠ Warning Poison

# MCPB + MCPA

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

IPCO (Clovitox Plus – PCP#24336)
Nufarm Agriculture (Tropotox Plus – PCP#8211)
UAP (Topside – PCP#22003)

## Formulation:

375 g/L MCPB, 25 g/L MCPA present as sodium salts and formulated as a solution. Container size - 10 L.

## Crops, Rates and Staging:

**Registered for all products:**
Apply 1.11 to 1.72 L per acre. Apply only that needed to control the target weeds.

| CROP | STAGE |
|---|---|
| Peas | 3 to 6 expanded leaves |
| Clover (Alsike, Ladino, Red, White Dutch, Wild white) | Monofoliate to 3 trifoliate leaf stage (with or without a cover crop). |
| Oats, wheat, rye or barley (alone or as a companion crop) | 2 leaf to flag leaf stage |
| Field Corn | 45 cm high to the start of tassling – use drop nozzles |
| Established pasture | After grazing or cutting when weeds have regrown to a susceptible stage |

**Seedling Forage Grasses:**
Apply at 1.11 to 1.42 L per acre from the 2 to 4 leaf stage:

Bromegrass (smooth, meadow)
Fescue (altai, creeping red, meadow, tall)
Green needlegrass
Reed canarygrass
Timothy
Wheatgrass (crested, intermediate, northern, pubescent, slender, streambank, tall, western)
Wild ryegrass (altai, Russian)

**Registered for Tropotox Plus, and Clovitox Plus only:**
Seedling alfalfa for seed production* at the 3 to 6 trifoliate stage.

Note: Seedling alfalfa vigour may be reduced in the year of treatment, however, the crop recovers and yield will not normally be affected.

** Since this use is registered under the User Requested Minor Use Label Expansion program, the manufacturers assume no responsibility for herbicide performance.* **Users of this treatment to seedling alfalfa do so at their own risk.**

## Weeds, Rates and Staging:

| WEEDS | RATE<br>STAGE | (L/ACRE) |
|---|---|---|
| Ball mustard, Lamb's-quarters, Stinkweed, Wild mustard, Wormseed mustard | Seedlings | 1.11 |
| Annual sow-thistle*, Hempnettle*, Redroot pigweed, Ragweed, Shepherd's-purse, Volunteer rapeseed (including canola), Wild Radish* | Seedlings | 1.72 |
| Curled dock, Perennial sow-thistle**, Plantain | Rosette | 1.72 |
| Bull thistle | Rosette to early bud | 1.72 |
| Buttercup (Creeping, Tall), Field Bindweed | In spring during rapid growth | 1.72 |
| Canada thistle | 6 inches (15 cm) to early bud | 1.72 |
| Horsetail* | 6 inches (15 cm) | 1.72 |

* Suppression only
**Topgrowth control only

## Cost (2005 suggested retail prices):

**Clovitox Plus:** $13.70 per L
**Topside:** $14.00 per L
**Tropotox Plus:** $13.25 per L

## Application Information:

**Water Volume:**
***Clovitox Plus:*** 71 to 91 L per acre.
***Tropotox Plus, Topside:*** 61 to 81 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Damage to peas or seedling forage legumes may occur if the crop is sprayed when under drought or disease stress. Under extremely hot or humid conditions, crop injury may be severe. Do not apply when temperatures are over 27 degrees C. Best activity on weeds occurs in warm weather.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze crop treated with Topside or cut for hay in the year of establishment. Cereals or pastures treated with Tropotox or Clovitox may be used for grazing or cut for greenfeed or hay 30 days after application. Forage legumes and peas treated with Clovitox may be used for animal feed 30 days after application.

**Recropping:** No restrictions listed. Phenoxy herbicides can persist in soils for weeks, particularly if dry or cool weather persists.
Do not seed sensitive crops immediately after spraying.

**Aerial Application:** Clovitox may be applied by air to established pasture and cereal crops (not underseeded to clover).

**Storage:** Do not freeze.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Danger Poison - Clovitox Plus

Caution Poison - Tropotox Plus & Topside

# Mecoprop

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

United Agri-Products (Mecoprop – PCP#10915)
Nufarm Agriculture (Compitox – PCP#7363)

## Formulation:

150 g/L mecoprop present as potassium salt. Container size - 10 L.

## Crops and Staging:

Spring wheat (including durum), barley and oats - 3 leaf to flag leaf stage.

## Weeds and Staging:

Apply to weeds from the 2 to 4 leaf stage.

- Black medic
- Canada thistle
  (top growth control only)
- Chickweed
- Cleavers
- Clover (volunteer)
- Corn spurry
- Lamb's-quarters
- Plantain
- Wild mustard

## Cost (2005 suggested retail price):

**Compitox:** $6.81 per L.
**Mecoprop:** $7.41 per L.

## Rates:

2.2 to 2.8 L/acre.

Use the high rate for weeds in an advanced stage of growth.

## Application Information:

**Water Volume:** 81 to 121 L per acre.

**Pressure:** 40 psi (275 kPa).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Apply in warm weather under good growing conditions. Avoid spraying in very hot weather or in drought conditions.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze or feed treated crop to livestock prior to crop maturity.

**Recropping:** No restrictions the year after application.

**Aerial application:** Not registered.

**Storage:** Do not freeze.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

# Muster Gold II

**Herbicide Group – 1, 2**
*(Refer to page 27)*

**This product is a prepackaged tank mix of Muster (page 158) and Assure II (page 65). Information listed is restricted to Crop, Weeds, Rates, and Cost. For other detailed information on the component products see the product pages listed above.**

## Company:

E. I. duPont Canada

## Formulations:

Muster Gold II contains 3 components:

**Muster (PCP#23569):** 75% ethametsulfuron-methyl as a water dispersible granule. Container size - 4 x 80 g water soluble bags.

**Assure II (PCP#25462):** 96 g/L quizalofop-p-ethyl as an emulsifiable concentrate. Container size - 8 L.

**Merge adjuvant (PCP#24702).** Container size - 8 L

## Crops and Staging:

Canola, including all herbicide tolerant canola varieties.

2 leaf stage to the beginning of bolting. If application is made prior to this stage, severe crop injury may occur.

## Weeds and Staging:

**Grasses:**

Apply at the 2 leaf to early tillering stage unless otherwise noted. For best results on volunteer cereals & wild oats apply before tillering begins

Barnyard grass
Fall pannicum
Green and yellow foxtail
Old witchgrass
Proso millet
Quackgrass* (2 to 6 leaf)
Volunteer cereals
Volunteer corn
Wild oat

**Broadleaf weeds:**
Apply at the cotyledon to 6-leaf stage unless otherwise noted.

Flixweed
Hemp-nettle
Redroot pigweed*
Stinkweed (1 to 4 leaf)
Wild mustard
Smartweed/lady's-thumb

*Suppression only

## Cost (2005 suggested retail price):

$21.65 per acre

## Rates:

**Muster:** 8 g per acre.

**Assure II:** 0.2 L per acre

**Merge adjuvant:** 0.2 L per acre (as packaged)

A case of Muster Gold II will treat 40 acres (16 ha).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 30 to 40 psi (210 to 275 kPa).

**Nozzles:** Flat fan nozzles with 50 mesh line strainers and screens.

# Muster Toss-N-Go

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

E. I. duPont Canada (PCP#23569)

## Formulation:

75% ethametsulfuron-methyl formulated as a dry flowable.

Container sizes – 320 g package (containing 4 x 80 g water soluble bags).

## Crops and Staging:

**Canola:** From the 2 leaf stage (main stem leaves) to the start of bolting. Do not apply prior to this stage as severe crop injury can occur.

**Condiment mustard (brown & oriental only):** From the 4 leaf stage but prior to bolting. Do not apply prior to this stage as severe crop injury can occur. Spraying must take place at least 60 days prior to harvest.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Apply from the 2 to 6 leaf stage. Stinkweed must be sprayed in the 1 to 4 leaf stage

At the 8 g/acre rate (one 320 g package treats 40 acres):

Flixweed *
Green smartweed
Hemp-nettle
Stinkweed **
Wild mustard

The 12 g/acre rate (one 320 g package treats 26.7 acres)*** controls above weeds plus:
Stinkweed
Redroot pigweed **

- * Spring seedlings only
- ** Suppression with Muster alone but control with Assure II plus Sure-Mix or a Poast Ultra plus Merge tank mix.
- *** High rate is for use in canola only. DO NOT use high rate on condiment mustard crops.

Muster applied alone requires the addition of Agral 90, Agsurf, or Citowett at 0.2 L per 100 L of spray solution. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

$16.59 to $24.86 per acre.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Equipment and Nozzles:** Flat fan nozzles. Sprayer must be equipped with continuous agitation. Use 50 mesh or coarser strainers and screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Do not use on crops that are stressed because of drought or flooding. Less than acceptable control will occur in fields where high weed populations exist and where stressful environmental conditions prevail (drought, cold weather). Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Thin crop stands or application prior to the 2 leaf stage, sandy soils or soils with low organic matter may increase the severity of the injury.

## Tank Mixes:

Do not mix with substances that contain boron or that release chlorine.

**Herbicides:**
***Canola only:*** Assure II, or Poast Ultra. The adjuvants used with these products are all that are required for tank mixes.

**Fertilizers:** None registered. Do NOT mix soluble bags with liquid fertilizers.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Muster label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 4 to 6 hours may reduce control.

**Grazing:** Do not graze or feed crop to livestock within 60 days of application.

**Preharvest:** Leave at least 60 days from application to harvest.

**Recropping:** Do not sow wheat, barley, oats or flax within 10 months of application. Do not sow canola, lentils, peas, fababeans, tame mustard, alfalfa, canaryseed, dry beans, fescues or red clover within 22 months of application. All other crops must not be sown until a "field bioassay" is performed at 22 months (or more) after application. Growers may experience reduced yields if other crops (such as corn) are grown without following these guidelines.

**Aerial Application:** Do not apply by air.

**Storage:** May be frozen.

**Environment:** Leave a 15 m buffer between the last sprayer pass and wetland areas or waterways. Leave a 5 m buffer between the last spray pass and woodlots, shelterbelts, ditch bank vegetation and the borders of dry sloughs.

## Tank Cleaning:

Sprayers used to spray Muster should be flushed out immediately after Muster is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1L of 3 % ammonia per 100 L water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

# Odyssey

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

BASF Canada (PCP#25111)

## Formulation:

35% imazamox and 35% imazethapyr formulated as a dispersible granule.

Container size - 4 x 173 g water soluble bags per 40 acre case, and 4 cases per 160 acre carton.

## Crops and Staging:

Field peas - 1 to 6 above-ground nodes (1 to 6 true leaves).
CLEARFIELD canola - 2 to 6 leaf stage.

Temporary crop yellowing may be observed shortly after application in field peas and CLEARFIELD canola.

**Forage Crops (seed production only)**
Alfalfa (seedling or established) – 1 to 4 leaf stage

## Weeds, Rates and Staging:

**At 12 g/acre (60 acres per case), Odyssey will control:**

Redroot pigweed
Wild mustard
Volunteer tame mustard

**At 17 g/acre (40 acres per case), Odyssey will control:**

*Grasses* - 1 to 4 main stem leaves, until tillers are visible:

Barnyard grass
Green foxtail
Persian darnel
Volunteer cereals
  (wheat, barley, oats)
Wild oat

*Broadleaf Weeds* - cotyledon to 4 leaf stage unless otherwise indicated:

Chickweed
Cleavers (up to 4 whorls)
Flixweed
Green smartweed
Hemp-nettle*
Kochia**
Lamb's-quarters**
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Stork's-bill
Volunteer canola (not
  CLEARFIELD varieties)
Volunteer tame mustard
Wild buckwheat*
Wild mustard

* Suppression only in field peas.
** Suppression only in field peas and CLEARFIELD canola.

Merge adjuvant (sold separately) must be used with Odyssey.

*CLEARFIELD Canola and Peas:* Use only Merge adjuvant at a rate of 0.5 L of Merge in 100 L of spray solution.

*Alfalfa:* Apply at 40 L/acre of water with Merge or Amigo adjuvants alone at a rate of 0.5 L adjuvant per 100L spray solution or with a non-ionic surfactant (Agral 90, Agsurf or Surf92) and a fertilizer solution (28-0-0 or 32-0-0) at a rate of 0.25L non-ionic surfactant per 100 L spray solution plus 0.8 L/acre fertilizer.

Do not apply Odyssey more than once per year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

$16.61 to $24.92 per acre.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan. Use 50 mesh or coarser filter screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

No information provided on the product label. Plants are under stress when conditions before or after application are very hot or cold, or excessively dry or wet. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result.

## Tank Mixes:

**Herbicides:**
***In CLEARFIELD canola only:***
Lontrel (0.17 - 0.23 L/acre).

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Odyssey label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Rainfall within 3 hours of application may reduce control.

**Grazing:** Do not graze treated crop or cut for feed prior to crop maturity. Field peas may be fed to livestock 30 days after application. Do not harvest forage or cut for hay.

**Preharvest Interval:** Do not apply within 60 days of harvest.

**Recropping:** Field peas, lentils, CLEARFIELD canola, canaryseed, oat, barley and spring wheat (including durum) may be seeded the first spring after application. Flax may be seeded the second spring after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

*NOTE: Breakdown of Odyssey may be slowed or delayed by environmental conditions such as drought, excessive cold and/or acid soils (pH less than 6.5) resulting in an increased risk of injury to rotational crops. The most tolerant crops are CLEARFIELD canola and legume crops, then cereals. Contact manufacturer for additional information on recropping intervals.*

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze. Store in a cool, dry place above 5° C.

**Environment:** Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 14 m between the outside boundary of the sprayed area and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Warning Eye and Skin Irritant

# Odyssey DLX

### Herbicide Group – 1, 2

*(Refer to page 27)*

## Company:

BASF Canada (PCP# 25111)

## Formulation:

The Odyssey DLX package contains two components: **Odyssey (PCP#25111):** 35% imazamox and 35% imazethapyr formulated as a dispersible granule.
Container size - 8 x 86.5 g water soluble bags per 40 acre case.

**Aramo (PCP# 27603):** 200 g/L tepraloxydim as an emulsifiable concentrate.
Container size - 2.67 L jug.

## Crops and Staging:

Field peas - 1 to 6 above-ground nodes (1 to 6 true leaves). Temporary crop yellowing may be observed shortly after application in field peas.

## Weeds and Staging:

**Grasses - 1 to 4 main stem leaves, until tillers are visible:**

Barnyard grass
Persian darnel
Volunteer oats

**Grasses – 1 to 6 main stem leaves, until tillers are visible:**

Green foxtail
Wild oats
Volunteer barley
Volunteer wheat

**Broadleaf Weeds - cotyledon to 4 leaf stage unless otherwise indicated:**

Chickweed
Cleavers (up to 4 whorls)
Flixweed
Green smartweed
Hemp-nettle*
Kochia*
Lamb's-quarters*
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Stork's-bill
Volunteer canola (not CLEARFIELD varieties)
Volunteer tame mustard
Wild buckwheat*
Wild mustard

* Suppression only in field peas.

## Rate:

**Odyssey:** 17 g per acre.

**Aramo:** 67 mL per acre.

One case of Odyssey DLX will treat 40 acres.

**Merge adjuvant (sold separately):** Merge must be used with Odyssey DLX at a rate of 0.5 L of Merge in 100 L of spray solution.

Add components in the order listed above.

Do not apply Odyssey DLX more than once per year. Refer to the product label for complete mixing instructions for this product. A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

N/A.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan. Use 50 mesh or coarser filter screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

No information provided on the product label. Plants are under stress when conditions before or after application are very hot or cold (15°C or less), or excessively dry or wet. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Rainfall within 3 hours of application may reduce control.

**Grazing:** Field peas may be fed to livestock 60 days after application.

**Preharvest Interval:** Do not apply within 60 days of harvest.

**Recropping:** Field peas, lentils, CLEARFIELD canola, canaryseed, oat, barley and spring wheat (including durum) may be seeded the first spring after application. Flax may be seeded the second spring after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

**NOTE:** *Breakdown of Odyssey may be slowed or delayed by environmental conditions such as drought, excessive cold and/or acid soils (pH less than 6.5) resulting in an increased risk of injury to rotational crops. The most tolerant crops are CLEARFIELD canola and legume crops, then cereals. Contact manufacturer for additional information on recropping intervals.*

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze. Store in a cool, dry place above 5°C.

Environment: Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 14 m between the outside boundary of the sprayed area and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Warning Eye and Skin Irritant

# Option 35 DF

**For use in Manitoba only.**

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

Bayer CropScience (PCP#27425)

## Formulations:

35% foramsulfuron formulated as a dispersible granule. Container size – 8 x 100 g packets per case.

## Crops and Staging:

Field corn at the 1 to 8 leaf stage or 5 to 6 visible collars

## Weeds and Staging:

**Annual Grasses:**

| WEED | LEAF STAGE |
|---|---|
| Barnyardgrass | 1 to 6 (to early tillering) |
| Foxtail, Green and Yellow | 2 to 5 (to early tillering) |
| Proso Millet | 2 to 5 (to early tillering) |
| Witchgrass | 2 to 4 |

**Broadleaf Weeds:**

| WEED | LEAF STAGE |
|---|---|
| Chickweed, Common | 4 to 6 |
| Lamb's-quarters | 4 to 8 |
| Mustard, Wild | 5 to 7 |
| Mustard, Wormseed | 5 to 9 |
| Nightshade, Eastern Black | 1 to 5 |
| Pigweed, Redroot | 1 to 7 |
| Ragweed, Common* | 2 to 4 |

* Suppression only.

## Cost (2005 suggested retail price):

N/A

## Rates:

**Option 35DF:** 40.5 g per acre (20 acres per case)

**28% UAN (liquid 28-0-0):** 1.0 L per acre

**Hasten Adjuvant:** 0.71 L per acre.

Option 35 DF must be tank mixed with:
**Banvel II:** 121 mL per acre.

Add Option 35DF to a half full tank, followed by Banvel II, then 28% UAN then Hasten adjuvant.

## Application Information:

**Water Volume:** 89 L per acre.

**Pressure:** 25 to 40 psi (175 to 275 kPa).

**Nozzles:** Either 80 or 110 flat fan nozzles designed for even coverage and canopy penetration. Use with 50 mesh or larger screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Under optimum conditions weed growth ceases within 1 to 3 days and yellowing of the growing point occurs in 5 to 10 days. Warm moist conditions provide for the best activity. Activity may be reduced or delayed if applied under cool and/or dry conditions or in the presence of heavy dew, fog, mist or rain or if weeds are dust covered. If the crop or weeds are under stress due to environmental conditions, delay application until the both crop and weeds have resumed active growth.

## Tank Mixes:

**Herbicides:**
Banvel II (see rates).

**Fertilizers:** Do not use any fertilizers or additives other than 28% UAN recommended.

**Insecticides:** Avoid application to corn that has been treated with organophosphorous insecticides.

**Fungicides:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours may reduce control.

**Grazing:** Do not graze treated corn crops or cut for forage within 45 days of application.

**Preharvest Interval:** Do not harvest for grain corn within 70 days of application.

**Recropping:** The following crops may be grown the season following application: barley, beans (dry common), canola, clover (red), corn (field and sweet), oats, peas, potatoes, soybeans, timothy, spring wheat. Winter wheat may be seeded 4 months after application.

**Aerial Application:** Do not apply by air.

**Storage:** Keep dry.

**Re-entry period:** Once spray residues are dry.

**Environment:** A buffer zone of 35 meters is required between the downwind edge of the boom and other non-target land plants and 15 meters from the downwind edge of the boom and water bodies and wetland areas.

## Tank Cleaning:

Option 35DF residues in the spray tank can cause severe injury to sensitive crops at very low concentrations. Sprayers should be cleaned out immediately before using another product. Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.
2. Fill the tank with ammonia/water solution (1 L of 3% household ammonia per 100L of water) and flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.
3. Remove all nozzles, screens and filters and clean in a separate container using an ammonia/water solution as above.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water. And wash any residue from the outside of the tank.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk. For additional information on tank cleaning see page 14.

## Hazard Rating:

Warning – Skin and Eye Irritant.

# Pardner/Koril 235

**See Bromoxynil section on page 78**

# Pinnacle

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

E. I. duPont Canada (PCP#22002)

## Formulation:

75% thifensulfuron methyl as a water dispersible granule. Container size – 8 x 8 g water soluble pouches

## Crops and Staging:

Soybeans - First fully expanded trifoliate leaf to flower initiation.

## Weeds and Staging:

Apply up to 4 inches (10 cm) tall or wide:

Lady's-thumb
Lamb's-quarters*
Redroot pigweed
Wild mustard
Velvetleaf*

* High rate of application only

## Cost (2005 suggested retail price):

$ 9.66 to $13.77 per acre.

## Rates:

2.2 to 3.2 g/acre (one container treats 20 to 28.5 acres).

Requires the addition of a non-ionic surfactant such as Agral 90, Agsurf, or Citowett at 1 L per 1000 L of spray solution. Oil surfactant blends such as Assist, CanPlus 411 or Sure-Mix may be used as adjuvants (check label for use rates).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** Minimum of 45 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat Fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Pinnacle applied to crops that have been under stress before application may result in crop injury. Stress conditions within 3 days after application may also result in crop injury.

Weeds under stress conditions at the time of application may not be adequately controlled.

Stress conditions are severe weather conditions, frost, low fertility, drought, water-saturated soils, and disease or insect damage.

Injury symptoms can be crop discoloration (yellowing, purpling or reddening), or stunting.

## Tank Mixes:

**Herbicides:**
Assure II (0.2 L/acre) plus Sure-Mix*.
Basagran (0.71 or 0.91 L/acre) plus Assist adjuvant. *
Basagran Forté (0.71 or 0.91 L/acre)*
Assure II (0.25 L/acre) plus Basagran Forte (0.71 or 0.91 L/acre) plus Sure-Mix or CanPlus 411 adjuvant. *

*Refer to appropriate labels for Pinnacle and adjuvant rates of application.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Pinnacle label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** If rainfall occurs soon after application control may be reduced. Several hours of dry weather are needed after application to allow uptake by the plants.

**Grazing:** Do not graze or cut for feed.

**Pre-harvest:** Leave at least 60 days from application to harvest.

**Recropping Interval:** Do not plant any crop other than wheat or barley for 30 days after application.

**Aerial Application:** Do not apply by air.

**Storage:** Store in closed original container in a dry area away from food or feed.

**Environment:** Do not mix, load or apply within 15 m of water bodies, wetlands or sensitive plants. Do not apply to irrigated land where the drainage water is also used to irrigate cropland.

## Tank Cleaning:

Pinnacle can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Pinnacle should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L of water). All nozzles, screens and filters should be removed and clean separately during the cleaning process. Do a clean water rinse of the tank, booms, hoses and nozzles to complete the procedure.

Refer to page 14 for additional information.

# Poast Ultra

### Herbicide Group – 1

*(Refer to page 27)*

## Company:

BASF Canada (PCP#24835)

## Formulation:

450 g/L sethoxydim formulated as an emulsifiable concentrate.

Container size – 2 x 7.7 L jug of Poast Ultra.

## Crops, Rates and Staging:

Crops are tolerant at all growth stages. However, the preharvest interval outlined in the "Restrictions:" section must be followed to avoid unacceptable residues of sethoxydim in harvested crops.

**To a maximum rate of 0.45 L per acre:**

Alfalfa
Alsike clover*
Canola
Chickling vetch
Cicer milkvetch*
Creeping red fescue (for seed only)
Dry beans (adzuki, kidney, lima, mung, pinto, white)
Dry field peas
Fababeans
Flax (not including Solin)
Lentil
Mustard
Potatoes
Sainfoin*
Shelterbelts
Soybeans
Sunflower
Sweet clover*

**To a maximum rate of 0.26 L per acre:**

Alsike clover**
Caraway
Cicer milkvetch**
Coriander
Dill
Safflower
Sainfoin**
Solin (low linolenic flax)
Sweet clover**

**To a maximum rate of 0.23 L per acre:**

Tame buckwheat

**To a maximum rate of 0.19 L per acre:**

Chickpea

* Established stands
** Seedling stands

## Weeds, Rates and Staging:

Optimum yield response occurs when weeds are controlled early.

| WEEDS AND STAGES | RATE (L/ACRE) | ACRES TREATED PER 7.7 L CONTAINER |
|---|---|---|
| Green or yellow foxtail, barnyard grass, volunteer corn, Persian darnel, proso millet, witchgrass, large crabgrass and fall panicum - 1 to 6 leaf stage | 0.13 | 60 |
| Wild oats, Volunteer wheat, oats and barley - 1 to 6 leaf stage except for low rate (See footnote*) | 0.13* or 0.19 | 60 or 40 |
| Quackgrass suppression - 1 to 3 leaf stage | 0.19 | 40 |
| Quackgrass (season long control) - 1 to 3 leaf stage | 0.45 | 17 |
| Foxtail barley suppression - prior to tillering. | 0.45 | 17 |

*Use the low rate in canola, flax and peas when wild oat, volunteer wheat and volunteer barley are from 1 to 4 leaves (best results prior to tillering) and under ideal growing conditions (adequate moisture, good fertility and moderate temperatures - 15 to 28°C). Do not apply under stress conditions.

**Merge Adjuvant (sold separately):** Merge must be used with Poast Ultra when applied alone or in tank-mix with other herbicides. When Poast Ultra is applied alone use 0.5 L to 1.0 L of Merge per 100 L of the final volume of spray solution. When applying to quackgrass and/or foxtail barley use 1.0 L Merge per 100 L of spray solution. See the tank mix section for Merge rates for tank mixing.

## Cost (2005 suggested retail prices):

$11.03 to $38.94 per acre.

## Application Information:

**Water Volume:** Apply at water rates of 20 to 40 L/acre Use a minimum of 40 L/acre if crop or weed growth is dense, and when spraying quackgrass.

Use 20 to 40 L/acre when using the 0.19 L/acre rate for wild oats, volunteer wheat and volunteer barley.

**Pressure:** 40 to 45 psi (275 to 300 kPa).

**Nozzles:** Stainless steel 80° or 110° flat fan nozzles tilted forward at an angle of 45°.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Most effective control is achieved when grasses are actively growing. Weeds stressed by drought, flooding, hot or prolonged cool temperatures (<15°C) and poor fertility are more difficult to control. Use the higher of the recommended rates for grasses stressed for less than 20 days. Do not apply to grasses stressed more than 20 days because of lack of moisture. Control may be reduced if temperatures are below 15°C. Retillering may occur under stress conditions or if fertility is low.

## Tank Mixes:

**Herbicides:** The following tank mixes can be applied with 0.13 to 0.19 L/acre of Poast Ultra.

**Merge Adjuvant (sold separately):** Use at 0.75 to 1.0 L of Merge per 100 L of mixed spray solution for most mixes except when mixing with Pursuit use 1.0 L per 100 L of solution

***In Flax:***

Buctril M (0.405 L/acre) (including Solin)
Lontrel 360 (0.23 to 0.34 L/acre)
Lontrel 360 (0.23 to 0.34 L/acre) + MCPA Ester (0.34 to 0.45 L/acre of 500 g/L formulations)
MCPA Ester (up to 0.45 L/acre of 500 g/L formulations)
The above tank mixes may reduce grass control, especially under adverse weather conditions.

***In Canola:***

Lontrel (0.17 to 0.34 L/acre)
Muster (8 to 12 g/acre)
Lontrel (0.17 L/acre) + Muster (8 g/acre)

***In Liberty Link canola only:***

Poast Ultra (0.09 L/acre) + Liberty (1.08 L/acre)

***In Field peas and CLEARFIELD canola:***

Poast Ultra (0.19 L/acre) plus Merge (0.4 L/acre) may be tank mixed with the following herbicides:

Pursuit (40 mL/acre) to control: Chickweed, stinkweed, cleavers, volunteer canola (non-CLEARFIELD varieties), hemp-nettle (peas only), redroot pigweed (light infestations only), wild buckwheat (light infestations only) smartweed, wild mustard.

The company does not provide guidelines for weed densities under light infestations. When in doubt, use the higher rate below or contact the manufacturer.

Pursuit (85 mL/acre) for all weeds on the Pursuit label. Check label directions for mixing order and additional timing restrictions for broadleaf partners.

Allow 4 days between application of Poast Ultra and application of herbicides other than those registered for tank mixing. Allow 5 days between application of Sencor and Poast Ultra. Allow 14 days for regrowth when applied in sequence with a grass control herbicide.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Poast Ultra label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 1 hour of application may reduce control.

**Grazing:** Do not graze the treated crop or cut for feed prior to crop maturity. Forage legumes may be cut after the specified preharvest interval.

**Preharvest Interval:** Forage legumes - 30 days; Dry peas & flax – 60 days; Lentil & chickpea - 65 days; Canola, chickling vetch & alfalfa – 70 days; Mustard – 76 days; Potatoes, dry beans, soybeans, & fababeans – 80 days; Buckwheat – 85 days; Solin – 86 days; Safflower – 90 days; Sunflower 105 days.

**Recropping:** Do not sow cereal or grass crops within 14 days of Poast Ultra application.

**Aerial Application:** May be applied by air in 10 to 20 L/acre of water. Merge should be added at rates of 0.10 to 0.20 L/acre.

**Storage:** May be frozen.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

# PrePass

**Herbicide Group – 2,9**
*(Refer to page 27)*

## Company:

Dow AgroSciences

## Formulation:

Each case of PrePass contains 2 components:

**PrePass A (PCP#27395):** 50 g/L florasulam formulated as a suspension concentrate.

**PrePass B (PCP#27394):** 360 g/L glyphosate IPA salt formulated as a solution.

Container sizes: PrePass A - 1.6 L, PrePass B - 2 x 10 L.

## Crops and Staging:

Prior to seeding of spring wheat (including durum), barley and oats.

## Weeds Controlled and Staging:

**Grasses at the 1 to 4 leaf stage:**

Downy brome
Green foxtail
Persian darnel
Volunteer barley
Volunteer wheat
Wild oat

**Broadleaf weeds controlled at the 1 to 4 leaf stage:**

Canada fleabane**
Common chickweed
Cleavers
Dandelion seedlings
Flixweed
Hemp-nettle
Lamb's-quarters
Narrow-leaved hawk's-beard**
Ragweed (common)**
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Smartweed (including Lady's-thumb)
Volunteer canola (all varieties)
Volunteer flax
Wild buckwheat*
Wild mustard

**Broadleaf weeds suppressed:**
Annual sow-thistle
Kochia
Perennial sow-thistle***

* up to 5 leaf stage
** up to 8 cm in height
*** better results from earlier applications

## Cost (2005 suggested retail price):

$7.95 per acre.

## Rate:

**PrePass A:** 0.04 L (40 mL)/acre
**PrePass B:** 0.5 L/acre

One case treats 40 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13 of the Guide to Crop Protection.

## Application Information:

**Water Volume:** 20 to 40 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Use nozzles capable of delivering appropriate pressures and volumes.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

**PrePass A:** Warm, moist growing conditions promote active weed growth and enhance activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

**PrePass B:** Best results are achieved when temperatures are near 20°C and when weeds are actively growing. Frost that kills more than 40% of above ground tissue will reduce control. Heavy dust layer on leaves will also reduce control.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:**
***PrePass A:*** No rainfast period is specified for this product; required interval may be up to 8 hours. Contact the manufacturer for more information.
***PrePass B:*** Heavy rainfall immediately after application may wash the chemical off the foliage. Do not apply if rainfall is forecast for the time of application. Contact manufacturer for more information.

**Grazing:** Do not graze treated crop or cut for feed within 7 days of application.

**Pre-harvest:** Leave 60 days between application and harvest.

**Recropping:** Spring wheat (including durum), barley and oat, may be seeded after application or the field may be fallowed. Barley, canola, field peas and wheat, may be grown the following season (10 months following an application).

**Aerial Application:** Do not apply by air.

**Storage:** Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

**Environment:** Leave a buffer zone of at least 30 m between the downwind edge of the boom and the closest edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrub lands. A buffer zone of at least 5 m is required between the downwind edge of the boom and the closest edge of aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

▽ Caution Poison

May cause eye irritation

# Prestige

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

Dow AgroSciences

## Formulation:

**Prestige A (PCP#25465):** 180 g/L fluroxypyr. Container size – 6.4 L.

**Prestige B (PCP#25464):** 50 g/L clopyralid and 280 g/L MCPA ester. Container size – 2 x 8.0 L.

Both are formulated as an emulsifiable concentrate.

## Crops and Staging:

Spring wheat (including durum),barley and canaryseed* from the 3 leaf stage until flag leaf emergence,

**Forage Grasses* (seedling and established) grown for seed production applied at the 4 leaf to flag leaf stage:**

Bromegrass (meadow, smooth)
Fescue (creeping red, tall)
Timothy
Wheatgrass (crested, intermediate)

* *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this product on forage grasses and canary seed do so at their own risk.***

## Weeds and Staging:

Unless otherwise stated, the following weeds will be controlled if sprayed in the 2 to 4 leaf stage.

Annual sow-thistle
Canada thistle*
Chickweed**
Cleavers (1-4 whorls)
Common groundsel
Dandelion***
Flixweed***
Hemp-nettle (2-6 leaf stage)**
Kochia
Lamb's-quarters
Perennial sow-thistle*
Redroot pigweed
Russian pigweed
Scentless chamomile
Shepherd's-purse
Smartweed
Stinkweed
Stork's-bill (1-8 leaf)
Tartary buckwheat
Volunteer canola
Volunteer flax (1-12 cm)
Volunteer sunflower
Wild buckwheat (1-4 leaf)
Wild mustard
Round leaved mallow (1 to 6 leaf)

* Spray when 4 to 6 inches (10 to 15 cm) high. Season long control, with some regrowth in the fall.

** Suppression only. Spray as late as possible (within recommended stages) to ensure the majority of weed flushes have emerged.

*** Spring rosettes only.

## Cost (2005 suggested retail price):

$14.70 per acre.

## Rates:

**Prestige A:** Apply at 0.32 L per acre

**Prestige B:** Apply at 0.8 L per acre

One case of Prestige will treat 20 acres.

## Application Information:

**Water Volume:** 40 L per acre

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan nozzles tilted forward at a 45° angle.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

The activity of the Prestige is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought or heat stress) or if heavy infestations exist.

## Tank Mixes:

**Herbicides:**

***In spring wheat (including durum) and barley:***
Achieve Liquid (200 mL/acre) plus Turbocharge adjuvant
Assert (0.53 to 0.65 L/acre) plus acidifier
Puma$^{120}$ Super (0.16 to 0.32 L/acre)

***In spring wheat (including durum):***
Horizon (93 to 117 mL/acre) plus Score adjuvant
Everest (17.4 g/acre) plus recommended surfactant

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note: The above mixes are those listed on the Prestige label only. For other possible mixes see the blue fold out chart inside back cover.**

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours of post-emergent application may result in reduced weed control.

**Grazing:** Do not cut or graze treated fields of wheat or barley for 7 days after application. Do not cut treated tall fescue fields for hay or forage. Do not graze treated tall fescue fields.

**Preharvest Interval:** Do not harvest crop within 60 days of application.

**Recropping:** Wheat, oats, barley, rye (not under-seeded to forage legumes, clover or alfalfa), flax, canola, field peas* and mustard may be seeded the season following Prestige application.

_*NOTE: Do not seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year._

Do not seed legume forages or crops other than those listed above until the second season following the Prestige application.

**Aerial Application:** Do not apply by air.

**Storage:** Store product in original containers in a secure, dry, heated area. If the product is frozen, bring to room temperature and agitate before use.

**Environment:** This product contains elements that are toxic to aquatic organisms and can damage susceptible non-target plants. Leave a 15 metre buffer between the nearest sprayer pass to non-target areas and domestic, irrigation or natural water or other wetland areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Danger Poison.

Warning Eye Irritant.

Caution Skin Irritant.

# Prevail Liquid

**Herbicide Group – 1, 4**
*(Refer to page 27)*

**This product is a prepackaged tank mix of Prevail A (Achieve Liquid page 54) and Prevail B (Curtail M page 87). Information listed is restricted to Crop, Weeds, Rates and Cost. For other detailed information on the component products see the product pages listed above.**

## Company:

Dow AgroSciences.

## Formulation:

The Prevail package contains 3 components:

**Prevail A (PCP#27579):** 400 g/L tralkoxydim formulated as a suspension concentrate. Container size - 4 L.

**Prevail B (PCP#23526):** 50 g/L clopyralid plus 280 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 8 L.

**Prevail Adjuvant (PCP#23527):** (Turbocharge). Container size - 4 L.

## Crops and Staging:

Spring wheat (including durum) and barley at the 3 to 6 leaf stage.

## Weeds and Staging:

**Grasses:**

Wild oats - 1 to 6 total leaves,to a maximum of 2 tillers.
Green foxtail - 1 to 5 total leaves, to a maximum of 1 tiller.
Persian darnel - 1 to 4 total leaves including tillers.
Optimum weed control and yield response occurs when weeds are removed before tillering.

**Broadleaves:**

Apply at the 1 to 4 leaf stage unless otherwise indicated

Annual sow-thistle
Canada thistle*
Common groundsel
Dandelion***
Flixweed***
Kochia (suppression)◇
Lamb's-quarters
Perennial sow-thistle**
Redroot pigweed
Russian pigweed
Scentless chamomile◇
Shepherd's-purse***
Smartweed
Stinkweed***
Tartary buckwheat
Wild buckwheat
Wild mustard
Volunteer canola

* Season long control, some regrowth may occur in the fall. Apply after all the thistles have emerged and are between 4 inches (10 cm) and 6 inches (15 cm) tall but prior to early bud stage.

** Top growth control only.

*** Spring rosettes only.

◆ 2 to 4 leaf stage.

## Cost (2005 suggested retail price):

$26.64 per acre.

## Rate:

The Prevail package will treat 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** 80° or 110° flat fan nozzles. All strainer and nozzle screens must be 50 mesh or coarser.

## Hazard Rating:

☠ Caution Poison

Warning : Eye and Skin Irritant

# Primextra II Magnum

**Herbicide Group – 15, 5**
*(Refer to page 27)*

## Company:

Syngenta (PCP#25730)

## Formulation:

400 g/L of s-metolachlor + 320 g/L of atrazine formulated as a liquid. Container size - 14 L.

## Crops and Staging:

Corn - Preplant incorporated (PPI) or Pre-emergence if irrigated within 10 days of application.

## Weeds and Staging:

Apply prior to the emergence of weeds. Weeds that have emerged prior to application will not be controlled.

American nightshade
Barnyard grass
Buckwheat
Eastern black nightshade
Green foxtail
Lady's-thumb
Lamb's quarters
Prostrate pigweed
Purslane
Ragweed
Redroot pigweed
Smartweed
Wild mustard
Witchgrass
Yellow foxtail
Yellow nutsedge*

* Herbicide must be incorporated for best control.

## Cost (2005 suggested retail price):

$22.03 to $29.29 per acre.

## Rates:

| WEED POPULATIONS | RATE (L/ACRE) | ACRES TREATED PER 14 L CONTAINER |
|---|---|---|
| Light infestations | 1.2 | 11.7 |
| Medium infestations | 1.4 | 10 |
| Heavy infestations | 1.6 | 8.8 |

Do not apply to soils with less than 1% or more than 10% organic matter.

## Application Information:

**Water Volume:** 61 L per acre

**Pressure:** 30 to 45 psi (200 to 300 kPa).

**Nozzles:** Flat fan with 50-mesh nozzle screens.

## Incorporation:

Incorporate using S-tine or C-tine cultivators or tandem disk. Do not incorporate deeper than 4 inches (10 cm).

To ensure that the product remains in the top 2 inches (5 cm) of soil, apply to a firm seedbed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 4 mph (6 km/hr ). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 6 mph (10 km/hr).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Extended periods of dry soil conditions may result in reduced weed control. Moderate rainfall after application will enhance activity. Heavy rainfall following application of Primextra II Magnum may dilute the metolachlor deeper than 2 inches (5 cm) and result in reduced weed control, particularly on light textured soils.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** May be tank mixed with liquid fertilizer for preplant incorporated applications. Conduct a compatibility test by performing a jar test prior to mixing the products in the tank. May be impregnated onto dry bulk fertilizers (except nitrate or superphosphate fertilizers).

**Insecticides:** None registered.

**Note: The above mixes are those listed on the Primextra label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Moderate rainfall shortly after application will enhance activity. Heavy rainfall reduces weed control by leaching the chemical out of the top few centimeters of soil. Inadequate rainfall after application (within 10 days) will cause reduced weed control.

**Grazing:** Do not graze or cut corn for feed before ear emergence.

**Recropping:** This product contains Atrazine. All crops except corn and triazine-tolerant canola may be affected the year following the use of Atrazine. Other more sensitive crops may be affected two or more growing seasons after application.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a dry place.

**Environment:** Do not mix or load this product within 30 m, or apply within 29 m, of any wells, lakes, streams, ponds, dugouts or sink holes.

## Tank Cleaning:

Refer to page 14.

## Hazard Ratings

☠ Caution Poison

Caution - Eye Irritant

Potential Skin Sensitizer

# Prism

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

E. I. duPont Canada Inc. (PCP#23983)

## Formulation:

25% rimsulfuron formulated as a dry flowable.
Container size - 480 g.

## Crops and Staging:

Irrigated potatoes* prior to flower initiation.

Potato tolerance to Prism differs by variety. Limit first use of Prism to a small area of each variety prior to adoption as a field practice. Delay cultivation for 7 to 10 days after application.

* *NOTE - Since applications to irrigated potato in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to irrigated potato in western Canada is at the risk of the user.***

## Weeds and Staging:

| WEED | STAGE |
|---|---|
| Barnyard grass<br>Green foxtail<br>Yellow foxtail<br>Witchgrass | 1 to 6 leaf stage, maximum 2 tillers |
| Quackgrass | 3 to 6 leaf stage (less than 10 inches or 25 cm leaf extended). |
| Redroot pigweed<br>Lamb's-quarters (suppression only) | 4 to 6 leaf stage (less than 4 inches or 10 cm tall or across). |

## Cost (2005 suggested retail price):

$20.31 per acre (plus adjuvant).

## Rates:

24 g/acre (one package treats 20 acres).

Add a recommended non-ionic surfactant such as Citowett Plus, Agsurf, or Agral 90 at 0.2 L per 100 L spray solution. Make only one application per growing season.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** a minimum of 40 L per acre..

**Pressure:** 25 to 40 psi (175 to 275 kPa).

**Nozzles:** Flat fan. 50 mesh screens or coarser.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Apply Prism when the temperature 24 hours before and after application is between 5°C and 28°C. Temperatures beyond this range increase the potential for crop injury. Rapid fluctuations in temperature will stress the crop (greater than a 20°C difference within 24 to 36 hours). Allow 48 to 72 hours for the crop to acclimatize before spraying Prism if severe temperature fluctuations occur. Crop injury may result if applications are made when potatoes are stressed by abnormally hot, humid, or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If potatoes have been injured by frost, wait 48 to 72 hours after normal growing conditions have resumed before applying Prism.

Warm, moist conditions after application promote good weed control with Prism while cool and/or dry conditions may reduce or delay activity. Weeds hardened off by cold weather or drought stress may not be controlled.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** Within 2 to 4 hours of application may reduce weed control.

**Preharvest:** Leave at least 30 days from application to harvest.

**Grazing:** Do not graze the treated crop or cut for hay.

**Recropping:** Spring barley, soybeans, white beans, red clover, sorghum, potatoes and field corn may be planted the year after application. Winter wheat may be planted 4 months after application. For all other crops, a field bioassay is recommended before planting.

**Aerial application:** Do not apply by air.

**Storage:** May be frozen.

**Environment:** Do not apply in areas where surface water from the treated area can run off to adjacent cropland, streams, irrigation water or wells. Leave a buffer of 10 m from the last spray pass and wetland areas or bodies of water. Leave a buffer of 5 m from the last spray pass and woodlots or shelterbelts.

## Tank Cleaning:

Do not clean equipment near desirable trees or other plants. Do not contaminate water sources. Drain tank, hose down tank interior and flush clean water through hoses for a minimum of 5 minutes. Create a water-ammonia cleaning solution (1 L of minimum 3% household ammonia per 100 L water) in spray tank. Flush hoses and nozzles, and add water to fill tank. Circulate cleaning solution for 15 minutes, and flush through boom again. Wash nozzles and screens in cleaning solution in pail. Repeat above tank and hose cleaning procedure. Rinse system with clean water for 5 minutes. Prior to using sprayer for next application, flush system with fresh water for 5 minutes.

Refer to page 14 for additional information.

## Hazard Rating:

Warning Eye Irritant

# Puma$^{120}$ Super

**Herbicide Group – 1**
*(Refer to page 27)*

## Company:

Bayer CropScience (PCP#25864)

## Formulation:

120 g/L fenoxaprop-p-ethyl formulated as an emulsifiable concentrate. Container sizes – 6.2 L, 99.3L

## Crops and Staging:

Spring wheat (including durum) with 1 to 6 leaves on the main stem plus 3 tillers

Barley† with 1 to 5 leaves on the main stem plus 2 tillers.

**† Apply to barley only when tank mixed with a registered broadleaf product.**

Durum wheat and barely may experience some initial, temporary stunting and yellowing that rarely results in yield loss. Injury is more likely under stress conditions (see Effect of Growing Conditions).

Treatment at the 3 to 4 leaf stage of crops and weeds will maximize crop tolerance and weed control. Temporary crop injury such as shortening or discolouration may be observed after application. Such injury is more likely to occur in barley and also when Puma$^{120}$ Super is applied outside recommended stages.

## Weeds, Rates and Staging:

| WEEDS | RATE (L/ACRE) | AREA (ACRES) PER 6.2 L | STAGE[†] |
|---|---|---|---|
| Green foxtail only | 0.154 | 40 | 1 to 6 leaf stage up to emergence of 3rd tiller |
| Low wild oat infestations[*] | 0.268 | 23.1 | |
| Moderate-heavy wild oat infestations, barnyard grass, green and yellow foxtail | 0.31 | 20 | |

[†] Apply at the 3 to 4 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

[*] Low wild oat rate for use on Wheat and Durum only, and when applied alone and not in a tank-mix.

## Cost (2005 suggested retail price):

$8.89 to $17.78 per acre

## Application Information:

**Water Volume:**

***Ground application:*** 23 to 45 L per acre.

***Aerial application:*** A minimum of 14 L per acre.

**Pressure:**

***Ground application:*** 40 psi (275 kPa)

***Aerial application:*** 42 psi (300 kPa)

**Nozzles:**

***Ground application:*** 80° or 110° flat fan nozzles tilted forward at a 45° angle. Do not use flood jet nozzles, controlled droplet application equipment or Sprafoil equipment.

***Aerial application:*** Use a combination of nozzles and pressure for a coarse droplet size distribution (400-800 microns).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

**DO NOT** apply Puma$^{120}$ Super 2-3 days prior to, or following, temperatures of 3°C or lower as crop injury may occur. Under stressful conditions (hot/dry, waterlogging, disease or insect damage) or heavy crop canopy, early application will improve weed control.

Do not apply by air when both the temperature is greater than 25°C and the relative humidity is less than 30%.

## Tank Mixes:

**Herbicides:**

***In Spring Wheat, Durum Wheat and Barley:***

**NOTE: Do NOT apply Puma$^{120}$ Super alone in barley. ALWAYS tank mix with a registered broadleaf herbicide.**

2,4-D Ester LV 600 (0.28 L/acre), LV 700 (0.24 L/acre)
Ally (2 to 3 g/acre)
Buctril M (0.4 L/acre)
Buctril M (0.40 L/acre) + Refine Extra (2.7 g/acre)
Curtail M (0.6[***] to 0.8 L/acre)
Dichlorprop + 2,4-D (0.71 L/acre)
DyVel[**] (0.5 L/acre)
Express Pack[**] (40 acres/case rate)
Frontline[**] (40 acres/case rate)
MCPA Amine or Ester (0.34 L/acre)
Prestige (20 acres/case rate)
Refine Extra (8 g/acre)
Refine Extra (8 g/acre) + MCPA Ester (0.34 L/acre)
Spectrum[**] (20 acres/case rate)
Thumper (0.40 L/acre)
Triton C (40 acres per case)[†*]
Trophy[*] (20 acres per case)
Unity [****] (40 acres/case rate)

***In Spring and durum wheat only:***

Attain (40 acres/case rate)
DyVel[**] DS (0.44 L/acre)
Lontrel 360 (0.17 L/acre)
Lontrel 360 (0.17 L/acre) + MCPA Ester (0.34 L/acre)[*]
Lontrel 360 (0.112 L/acre) + MCPA Ester (0.34 – 0.45 L/acre)[*]
Mecoprop (2.2 to 2.8 L/acre)[*]

[†] Not for use in malt barley.
[*] Use only at the high rate of Puma$^{120}$ Super
[**] Use only at the green foxtail rate of Puma$^{120}$ Super
[***] Low Curtail M tank-mix rate for use in Barley only.
[****] Not registered for use in Manitoba.

**Fertilizers:** None registered

**Insecticides:** None registered

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Puma$^{120}$ Super label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Leave an interval of 7 days prior to application or 4 days after application of Puma$^{120}$ Super, when applying any pesticide that is not registered as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 1 hour may reduce control.

**Grazing:** Do not graze or cut for hay, within 25 days of application

**Preharvest Interval:** Do not harvest within 65 days of application.

**Recropping:** No restrictions in the year after application. Only one application may be made per year.

**Aerial Application:** May be applied by air.

**Storage:** Do not freeze.

**Environment:** Leave 3 metres from the downwind edge of the spray boom to water or wetland areas by ground or air. Leave 10 metres by ground and 33 meters by air from the downwind edge of the boom to sensitive non-target land areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

▽ Caution Poison.

Eye and Skin Irritant.

# Pursuit

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

BASF Canada (PCP#23844)

## Formulation:

240 g/L imazethapyr formulated as a liquid.
Container size - 2 x 3.3 L jugs per case.

## Crops and Staging:

| CROP | STAGE |
|---|---|
| CLEARFIELD canola | Apply after the first leaf stage. |
| Dry beans (pinto, pink and red varieties only) | Up to and including the second trifoliate leaf stage |
| Soybeans (Manitoba only) | Up to and including the third trifoliate leaf stage |
| Field peas | May be applied up to the sixth above-ground node stage (6 true leaves). |
| Seedling alfalfa (forage or seed production)◊ | Apply after the first trifoliate leaf stage. |
| Established alfalfa (seed production only)◊◊ | Apply before alfalfa reaches 12 inches (30 cm) in height. |
| Chickling vetch grown for seed | Apply at the 5 - 7 leaf stage. |

◊ Apply only to seedling alfalfa that will remain in production for at least 3 years following application. Apply only once during the life of the alfalfa stand.

◊◊ Do not apply in the last year of established alfalfa stands.

Do **NOT** use in the brown or dark brown soil zones (except for use in dry beans and alfalfa under irrigated brown soils); rotational crops may be severely injured due to carryover in these soils.

## Weeds and Staging:

***In field peas and CLEARFIELD canola varieties. Apply up to the 4 leaf stage, unless otherwise indicated:***

Chickweed
Cleavers
Green foxtail
Hemp-nettle*
Lamb's-quarters◊
Redroot pigweed
Shepherd's purse*
Smartweed
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Volunteer barley**
Volunteer wheat**
Wild buckwheat
Wild mustard
Wild oats (2 to 4 leaf stage)

***In seedling and established alfalfa:***

Common groundsel***◊
Green foxtail◊
Green smartweed ***
Lamb's quarters***◊
Redroot pigweed
Shepherd's purse***◊
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Wild mustard

***In dry beans:***

Hairy nightshade (up to 6 leaf stage)

* In field peas only.
** Suppression in CLEARFIELD canola only.
*** Seedling alfalfa only.
◊ Suppression

## Cost (2005 suggested retail price):

$24.38 per acre.

## Rates:

85 mL/acre (40 acres per jug).

A non-ionic surfactant with at least 80% active ingredient (Agral 90, Agsurf, Surf 92) should be added at a rate of 0.25 L per 100L of spray solution. Do not over apply Pursuit, as crop injury may result. Only one application may be made during the growing season.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 to 160 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Plants are under stress when conditions before or after application are very hot or cold, excessively dry or wet. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result.

## Tank Mixes:

None registered.

**Note: There are no tank mixes listed on the Pursuit label. To check for other possible tank mixes see the blue fold out chart inside the back cover.**

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze or harvest seedling alfalfa within 14 days of treatment. Do not graze or harvest field peas for feed within 30 days. Do not graze other treated crops or cut for feed prior to crop maturity.

**Preharvest Interval:** Do not apply within 60 days of harvesting field peas or chickling vetch, within 70 days of harvesting CLEARFIELD canola, within 75 days of harvesting dry beans, or within 85 days of harvesting soybeans.

**Recropping:** Rotate to barley, spring wheat (not durum), lentils, alfalfa, field peas or CLEARFIELD canola the year following application. The manufacturer recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crop other than those listed above. However, yield losses within the test strips may not be noticed unless the yield can be compared to an untreated area seeded adjacent to the Pursuit-treated strip. In case of crop failure, only field peas or CLEARFIELD canola may be replanted in the year of application.

*NOTE: Breakdown of Pursuit may be slowed or delayed by environmental conditions such as drought, excessive cold and/or acid soils (pH less than 6.5) resulting in an increased risk of injury to rotational crops. The most tolerant crops are CLEARFIELD canola and legume crops, then cereals. Contact manufacturer for additional information on recropping intervals.*

**Aerial application:** Do not apply by air.

**Storage:** Do not freeze. If the product is exposed to temperatures below 0°C, thaw the product completely and shake the container vigorously prior to use.

**Environment:** Do not apply within 15 m of shelterbelts, water bodies, wetlands, and woodlots.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Keep out of reach of children.

# Pursuit Ultra

**Herbicide Group – 1, 2**
*(Refer to page 27)*

**Pursuit Ultra is a prepackaged tank mix of Pursuit (Page 177) at 0.04 L/acre and Poast Ultra (Page 166). Information listed is restricted to Crop, Weeds, Rates and Cost. For other detailed information on the component products including restrictions see the product pages listed above.**

## Company:

BASF Canada

## Formulation:

**The Pursuit Ultra package contains:**

**Poast Ultra (PCP#24835):** 450 g/L sethoxydim formulated as an emulsifiable concentrate.

**Pursuit (PCP#23844):** 240g/L imazethapyr formulated as a liquid.

Container size – 2 x (1.65L Pursuit + 7.7L Poast Ultra). Jugs are split internally and contain both Poast Ultra and Pursuit. Each split jug treats 40 acres.

## Crops and Staging:

CLEARFIELD canola - after the 1 leaf stage.

Field pea - up to the 6th above ground node stage (six true leaves).

Do NOT use in the brown or dark brown soil zones as rotational crops may be severely injured due to carryover in these soils.

## Weeds and Staging:

**Grasses: at the 1 to 6 leaf stage:**

Barnyard grass
Green and yellow foxtail
Quack grass*
Persian darnel
Proso millet
Volunteer barley
Volunteer oat
Volunteer corn
Volunteer wheat
Witchgrass
Wild oat

**Broadleaf weeds up to the 4 leaf stage:**

Chickweed
Cleavers
Hemp nettle (peas only)
Redroot pigweed**
Smartweed
Stinkweed
Volunteer canola (non-CLEARFIELD varieties)
Wild buckwheat**
Wild mustard

* Suppression
** Light infestations only

## Rates:

**Poast Ultra:** 0.19 L/acre;
**Pursuit:** 40 mL/acre
(One split jug treats 40 acres).

**Merge Adjuvant** (sold separately): Merge must be used with Pursuit Ultra at a rate of 1.0 L of Merge per 100 L of the total volume of spray solution.

## Cost (2005 suggested retail price):

$26.34 per acre.

## Application Information:

**Water Volume:** 40 L per acre

**Pressure:** 40 psi (275 kPa)

**Nozzles:** Stainless Steel 80° or 110° flat fan nozzles tilted forward at a 45° angle.

## Restrictions:

Adhere to all restrictions for the Poast Ultra and Pursuit components.

*NOTE: Breakdown of Pursuit may be slowed or delayed by environmental conditions such as drought, excessive cold and/or acid soils (pH less than 6.5) resulting in an increased risk of injury to rotational crops. The most tolerant crops are CLEARFIELD canola and legume crops, then cereals. Contact manufacturer for additional information on recropping intervals.*

# Refine Extra Toss-N-Go

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

E. I. duPont Canada (PCP#22352)

## Formulation:

50% thifensulfuron methyl plus 25% tribnuron methyl formulated as a dry flowable.

Container size - 4 water soluble bags (80 g each, total 320 g).

## Crops and Staging:

Apply from 2 leaf to the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

**Cereals:**

Barley
Oats
Wheat (including durum, spring and winter)

**Seedling or established forage grasses for forage or seed production:***

Bromegrass (meadow, smooth)
Creeping red fescue
Kentucky bluegrass**
Orchardgrass
Tall fescue
Wheatgrass (crested, intermediate, northern, pubescent, slender, streambank, tall, western)

**Since the use of this product on forage grasses is registered under the User Requested Minor Use registration system, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this product on forage grass do so at their own risk.***

** Established stands only.

## Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

**Weeds Controlled:**

Annual smartweed (green smartweed, lady's-thumb)
Ball mustard
Chickweed (1 to 6 leaf)
Common groundsel
Corn spurry
Cow cockle
Flixweed
Hemp-nettle
Kochia (group 2 resistant biotypes with Banvell II tank mix only)
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola (CLEARFIELD varieties with 2,4-D or MCPA mixes only)
Volunteer sunflowers
Wild buckwheat (1 to 3 leaf)
Lamb's-quarters
Narrow-leaved hawk's-beard
Wild mustard

**Weeds Suppressed:**

Canada thistle, sow-thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Cleavers (1 to 3 whorls)
Round-leaved mallow (2 to 6 leaf)
Scentless chamomile
Stork's-bill (2 to 6 leaves)
Toadflax (less than 6 inches or 15 cm tall)

## Cost (2005 suggested retail price):

$6.40 per acre.

## Rate:

8 g/acre (one 320 g container treats 40 acres). Add Agral 90, Agsurf, or Citowett Plus at 0.2 L per 100 L of spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** Minimum 22 L per acre.

**Pressure:** 30 to 40 psi (210 to 275 kPa).

**Nozzles:** Flat fan nozzles with 50 mesh line strainers and screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Do not apply to wheat, barley or oats that are str [illegible] by severe weather conditions (frost, drought or w [illegible] rated soil) as crop injury may result.

Under certain conditions (heavy rainfall, prolon [illegible] weather, frost conditions, wide fluctuations in da [illegible] temperatures) lightening in crop colour and reduction in crop height may occur.

Kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

## Tank Mixes:

Do not mix with substances that contain boron or that release chlorine.

**Herbicides:**

| Tank Mix Partner | CROPS | | | |
|---|---|---|---|---|
| | **Spring wheat** | **Durum** | **Barley** | **Oats** |
| 2,4-D amine or ester (0.34 to 0.45 L/acre)*◇ | ✓ | ✓ | ✓ | |
| Assert (0.53 to 0.65 L/acre) | ✓ | ✓ | ✓ | |
| Assert (0.53 to 0.65 L/acre) + MCPA ester (0.28 to 0.45 L/acre)* | ✓ | ✓ | ✓ | |
| Attain (80 acres per case)◇ | ✓ | | ✓ | |
| Banvel II (44.5 mL/acre)◇ | ✓ | | ✓ | |
| Curtail M (0.61 L/acre)◇ | ✓ | | ✓ | |
| Everest (17.4 g/acre) + 2,4-D amine or ester (up to 0.45 L/acre)*◇ | ✓ | | | |
| Horizon (95 to 115 mL/acre) plus Score adjuvant | ✓ | ✓ | | |
| Horizon (95 mL/acre) + Banvel II (44.5 mL/acre) plus Score adjuvant | ✓ | | | |
| Horizon (95 mL/acre) + MCPA ester (0.34 to 0.45 or 0.23 L/acre)* plus Score adjuvant | ✓ | ✓ | | |
| Lontrel 360 ( 85 mL/acre)◇ | ✓ | | ✓ | |
| Lontrel 360 ( 85 mL/acre) + 2,4-D ester* or MCPA ester* (0.34 L/acre)◇ | ✓ | | ✓ | |
| MCPA amine or ester (0.28 to 0.45 or 0.23 L/acre)*◇ | ✓ | ✓ | ✓ | ✓ |
| Puma$^{120}$ Super (0.16 to 0.31 L/acre) | ✓ | ✓ | ✓ | |
| Puma 120 Super (0.16 to 0. 31 L/acre) + MCPA ester (0.23 or 0.34 L/acre)* | ✓ | ✓ | ✓ | |

* 500 g ai/L formulation. ◇ Tank mix requires the addition of a non-ionic surfactant.

Check the above tank mix partner(s) respective labels for additional staging and varietal restrictions.

**Fertilizers:** None registered. Do not mix soluble bags with liquid fertilizers.

**Note: The above mixes are those listed on the Refine Extra label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 4 hours may reduce control.

**Grazing:** Must not be grazed or fed to livestock for 7 days after treatment.

**Recropping:** None the year after treatment. Canola, flax, lentils and alfalfa may be planted 2 months after an application of Refine Extra.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool, dry place. May be frozen.

**Environment:** Leave a 15 meter buffer zone between last spray swath and sensitive wild life habitats such as shelterbelts, wetlands, sloughs and woodlots.

## Tank Cleaning:

Refine Extra can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Refine Extra should be flushed out immediately after Refine Extra is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/ammonia rinse (1 L of 3% ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned after applying this product. Rinse the tank, booms, hoses, and nozzles with clean water to complete the process.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

## Hazard Rating:

Warning - Eye and Skin Irritant

# Refine M

**Herbicide Group – 2, 4**
*(Refer to page 27)*

**This product is a prepackaged tank mix of Refine Extra (page 180) and MCPA ester (page 152). Information listed is restricted to Crop, Weeds, Rates, Cost and Tank mixes. For other detailed information on the component products see the product pages listed above.**

## Company:

E. I. duPont Canada

## Formulation:

**Refine Extra (PCP#22352):** 50% thifensulfuron methyl + 25% tribenuron methyl; formulated as a water dispersible granule. Container size - (2 x 320 g).

**MCPA ester (PCP#26161):** 500g/ L MCPA formulated as an emulsifiable concentrate. Container size -2 x 9.1 L.

One case treats 80 acres

## Crops and Staging:

Apply from full 3 leaf to the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

**Cereals:**
Barley, Wheat (including durum) and Oat

## Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

## Weeds Controlled:

- Annual Smartweed (green smartweed, lady's-thumb)
- Ball mustard
- Chickweed (1 to 6 leaf)
- Common groundsel
- Corn spurry
- Cow cockle
- Flixweed
- Hemp-nettle
- Kochia
- Lamb's-quarters
- Narrow-leaf hawk's-beard
- Redroot pigweed
- Russian thistle
- Shepherd's-purse
- Stinkweed
- Tartary buckwheat
- Volunteer canola (including CLEARFIELD varieties)
- Volunteer sunflowers
- Wild buckwheat (1 to 3 leaf)
- Wild mustard

## Weeds Suppressed:

Canada thistle, sow-thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Cleavers (1 to 3 whorls)
Round-leaved mallow (2 to 6 leaf)
Scentless chamomile
Stork's-bill (2 to 6 leaves)
Toadflax (less than 6 inches or 15 cm tall)

## Cost (2005 suggested retail price):

N/A

## Rate:

One split jug treats 40 acres (80 acres per case). Add Agral 90, Agsurf, or Citowett Plus at 0.2 L per 100 L of spray solution. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** Minimum 22 L per acre.

**Pressure:** 30 to 40 psi (210 to 275 kPa).

**Nozzles:** Flat fan nozzles with 50 mesh line strainers and screens.

## Tank Mixes:

Do not mix with substances that contain boron or that release chlorine.

**Herbicides:**

***Tank mix partners in spring wheat (including durum)***
Horizon (95 mL/acre) plus Score adjuvant*

***Tank mix partners in spring wheat (including durum) and barley***
Puma$^{120}$ Super (0.16 or 0.31 L/acre)*

*No additional non-ionic adjuvant required

Check the above tank mix partners respective labels for additional staging and varietal restrictions.

**Fertilizers:** None registered. Do not mix soluble bags with liquid fertilizers.

**Note: The above mixes are those listed on the Refine M label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

# Reflex*

*(For use only in the Red River Valley of Manitoba)

**Herbicide Group – 14**
*(Refer to page 27)*

## Company:

Syngenta (PCP#24779)

## Formulation:

240 g/L fomesafen formulated as a solution.

Container size- 10L.

## Crops and Staging:

Dry beans◆ in the 1 to 2 trifoliate leaf stage. For use in the Red River Valley of Manitoba only.

*◆ NOTE - Since applications to beans in the Red River Valley has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to beans is at the risk of the user.***

## Weeds and Staging:

Broadleaf weeds controlled by Basagran at the 0.71 L/acre rate plus improved control of the following weeds up to the 4-leaf stage:

Cocklebur
Eastern black nightshade
Lady's thumb
Lamb's-quarters
Ragweed (common)
Redroot pigweed
Velvetleaf*
Wild mustard

* Suppression only

## Cost (2005 suggested retail prices):

$7.79 per acre, not including cost of Basagran or adjuvant.

## Rate:

Reflex is registered in the Red River Valley of Manitoba only as a tank mix at a rate of 235 mL/acre Reflex plus 0.71 L/acre Basagran plus Agral 90 at 1 L per 1000L of spray solution.

## Application Information:

**Water Volume:** Minimum 81 L per acre. Increase water volume to 142 L per acre for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.

**Pressure:** 275 kPa (40 psi). Increase pressure to 420 kPa (60 psi) for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.

**Nozzles:** Use nozzles capable of delivering appropriate pressures and volumes.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Weed control and crop tolerance may be reduced under certain stress conditions such as cold temperatures, excess moisture, drought and injury from hail or previous herbicide applications.

## Tank Mixes:

Herbicides: Reflex is only registered for use in a Basagran tank mix. See Rates.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

## Restrictions:

**Rainfall:** Reflex is unaffected by rain falling 4 hours after application.

**Grazing:** Do not graze treated crop or cut for hay. There is insufficient data to support such use.

**Preharvest:** Leave at least 84 days from application to harvest.

**Recropping:** Winter wheat may be sown 4 months after application. Spring wheat, dry beans and field corn may be grown the year following an application.

Do not apply Reflex to any field more often than once every 2 years.

These recropping restrictions refer only to the Red River Valley of Manitoba. Use outside this is region is not registered as recropping options have not been determined.

**Aerial Application:** Do not apply by air.

**Storage:** No information on label.

**Environment:** Leave a buffer zone of at least 15 m between the last spray swath and the edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrublands as well as aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs. Do not apply when winds are greater than 15 km/hr.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

Warning- skin and eye irritant; potential skin sensitizer

# Reglone Desiccant

**Herbicide Group – 22**
*(Refer to page 27)*

## Company:

Syngenta (PCP#26396)

## Formulation:

240 g/L diquat formulated as a solution.
Container size - 10 L.

## Crops and Staging:

Reglone is used to dry immature green material at top of indeterminent crops and green weeds to facilitate harvest. Reglone will not speed maturity of green crops. Treatment before the recommended stage can result in reduced yield and quality. Add 0.1 L of Agral 90 or Agsurf per 100 L of spray solution for all applications except those indicated.

| CROP | STAGE | RATE (L/ACRE) | |
|---|---|---|---|
| | | Ground | Aerial |
| Dry beans, soybeans | Crop has lost 80 to 90 percent of leaves and 80 percent of pods are yellow. | 0.5 to 0.7<br>(use high rate for dense crop, heavy weed infestations) | 0.7 to 0.9<br>(use high rate for dense crop, heavy weed infestations) |
| Flax, Solin | 75 percent of bolls brown. | | |
| Lentils | Lowest pods are light brown and rattle when shaken. | | |
| Mustard | 75 percent of seed has turned brown | | |
| Canola* | 60 to 75 percent of seed has turned brown. | | |
| Peas | Bottom pods are ripe and dry, seeds detached from pods. | | |
| Chickpeas◇ | Plants yellow, pods mature, seeds changed colour and detached from pods. | | |
| Sunflowers | Backs of sunflower heads and bracts are turning yellow and seed moisture is 20 to 50 percent. | | |
| Potatoes (some top growth and/or some weeds) | Two weeks prior to harvest | 0.7 to 0.9** | 2 applications required. First application – 0.7 to 0.9 L/acre**. Second application (4 to 5 days later) at 0.5 L/acre |
| Potatoes (dense crop, heavy weed infestations) | | 1.4** | |
| Alfalfa, bird's -foot trefoil, red and white clover (for seed production only).*** | Pods are ripe but before shattering. Harvest within 7 days. | 0.7 to 1.1<br>(use high rates for dense crops, heavy weed infestations) | 0.7 to 1.1<br>(use high rates for dense crops, heavy weed infestations) |

* This product can cause shattering losses in canola. It should only be used on Argentine canola to assist in the harvest of a severely lodged crop.

** Use high rate for dense or immature vines.

*** Do not use on forage legumes that have been treated with a residual herbicide in the previous 12 months.

◇ Aerial applications to chickpea - 0.7 L/acre only

## Cost (2005 suggested retail prices):

$22.11 per L plus surfactant.

## Application Information:

**Water Volumes:**

*Ground applications:* 91 to 222 L per acre. Use 222 to 445 L per acre on potatoes.

*Aerial applications:* 18 L per acre. Use the highest water volumes when crop canopy is heavy or if weed growth is dense.

**Pressure**:

*Ground application:* 200 to 275 kPa (30 to 40 psi).

*Aerial applications:* 150 to 200 kPa (22 to 30 psi).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Best results under cloudy conditions or in evening.

Shattering losses can increase if heavy winds, rain or hail occur after the crop has dried down.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** Fungicides may be added when applying Reglone to potatoes for vine killing.

## Restrictions:

**Rainfall:** Within 15 minutes may reduce effectiveness.

**Grazing:** Crop residues remaining after harvest may be fed to livestock.

**Preharvest Interval:** Wait 4 to 7 days before harvesting lentil. Do not exceed 7 days to harvest when treating forage legumes. Wait at least 7 days before harvesting Lupins. Wait 7 to 10 days before combining canola and mustard, but do not wait longer than 14 days. Wait 15 to 20 days for sunflowers. Harvest flax and peas when sample tests dry.

**Recropping:** No restrictions the year after application.

**Aerial Application:** May be applied by air in a minimum of 18 L per acre water volume.

**Storage:** Do not freeze.

**Environment:** Do not apply by air where wetlands or other good wildlife cover are present. Leave a 15 m border around the edges of sloughs and other wildlife cover. Apply when wind is between 3.5 and 9 km/hr.

## Tank Cleaning:

When finished spraying Reglone, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and Agral 90, Agsurf at 0.6 L per 1,000 L spray solution. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members are likely to frequent or walk.

Refer to page 14 for additional information.

## Hazard Rating:

Caution Poison

Warning Skin Irritant

Potential Skin Sensitizer

# Remedy EC

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

Dow AgroSciences (PCP#26420)

## Formulation:

480 g/L of triclopyr acid formulated as an emulsifiable concentrate. Container size - 2 X 10 L jugs

## Crops and Staging:

Pastures and Rangeland. Staging is based on weed stage.

## Weeds and Staging:

For best results, apply to the following weeds when leaves are fully expanded and plants are actively growing, until autumn coloration begins to appear. Single stem applications should not be used on woody species greater than 8 ft. (2.5 m) tall.

**Woody plants controlled:**

Alder
Ash
Aspen
Basswood
Beech
Birch
Blackberry
Buckthorn
Cherry*
Chokecherry*
Cottonwood
Dogwood
Elderberry
Elm*
Hawthorn
Maples
Oaks*
Poison oak
Pines*
Poplar
Red maple*
Raspberry*
Sumac
Tamarack
Wild rose
Willow

* These species may require treatment at the higher rate and may need to be retreated the following year, particularly if the original treatment was made at the lower rate.

**Non-woody annual and perennial broadleaved weeds controlled are:**

Burdock
Chicory
Curled dock
Dandelion
Field bindweed
Lamb's-quarters
Ragweed
Smartweed spp.
Smooth bedstraw
Vetch
Wild lettuce

## Cost (2005 suggested retail price):

$28.00 per L.

## Rate:

**Ground application:**
***Broadcast foliar*** - Woody species: 1.6 to 3.2 L/acre, Non-woody species: 0.4 to 1.62 L/acre
***Single stem:*** mix 0.04 to 0.08 L per 10 L of spray solution.
***Backpack (low volume foliar):*** 0.1 to 0.5 L per 10 L of spray solution.

**Aerial application:** 1.6 to 3.2 L/acre

## Application Information:

**Water Volume:**
*Broadcast foliar:* Minimum 80 L per acre. Proper coverage is important for effective control. Even, uniform coverage, without gaps or pooling of droplets is preferred.
*Single stem:* Apply to the point of runoff.
*Backpack (low volume foliar):* Thoroughly wet foliage but not to runoff.
*Larger Woody Species:* For control of woody species larger than 8 ft. (2.5 m) the basal bark method of control can be used to apply small amounts of Remedy mixed in oil carrier (mineral oil or vegetable oil) directly to the bark of the trunk. Several methods can be used. See the label for directions on this use.
*Aerial application:* A minimum of 12 L per acre.

**Pressure:**
*Broadcast foliar:* Maximum 275 kPa (40 psi).
*Nozzles:* Use application equipment that provides even coverage of large droplets that are not prone to drift.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Avoid spraying if temperatures exceed 28°C.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** No rainfree period is specified on the label; required interval may be up to 8 hours. Contact the manufacturer for more information.

**Grazing:**

***For lactating dairy animals:***

Rates below 1.9 L/acre - treated areas may be grazed or harvested for greenfeed 14 days after treatment.

Label rates greater than 1.9 L/acre - restrict grazing or greenfeed for 60 days following treatment. Do not harvest treated area for hay for 60 days after treatment.

***For other livestock:***

Rates below 1.9 L/acre - There is no restriction on grazing or harvesting treated areas for greenfeed but do not harvest treated areas for hay for 7 days after treatment.

Label rates greater than 1.9 L/acre - restrict grazing and harvest for greenfeed or hay for 14 days following treatment.

If less than 25% of grazed area is treated, there is no grazing restriction for other livestock.

Remove all animals from grazing treated grass or consumption of treated hay at least 3 days prior to slaughter.

**Aerial Application:** May be applied by air.

**Storage:** Store above -2°C. If frozen agitate container before use.

**Environment:** This product is highly toxic to fish, aquatic crustaceans, and plants. Do not apply to water. Do not spray at the edge of wetlands, lakes, ponds, streams, rivers, and wetland wildlife habitats. Buffer zones are dependent on rate of application, method of application and boom height. Consult the product label for specific buffer zone requirements.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

▽ Caution Poison.

# Reward

## Herbicide Group – 22

*(Refer to page 27)*

## Company:

Syngenta (PCP#26271)

## Formulation:

Reward - 240 g/L diquat formulated as a solution.

Container sizes - 4 x 3.78L.

## Use:

Control of water weeds such as coontail, duckweed, Canada water weed, pond weeds, and water milfoil in farm dugouts. Offers temporary control of certain species of algae.

## Cost (2005 suggested retail prices):

$46.17 per L

## Timing:

Mid-May through late June.

## Rates:

**Dugouts less than 5 feet (1.5 m) deep:** Apply Reward at 7.4 L per acre.

At this rate, 2.2 L of Reward will treat a dugout that is 160 feet by 80 feet (49 m x 24.4 m).

**Dugouts more than 5 feet (1.5 m) deep:** Apply Reward 10 to 11.8 L per acre.

At these rates, a dugout that is 160 feet by 80 feet (49 m x 24.4 m) will require 3.0 to 3.5 L of Reward.

Milfoil can be controlled in early stages by 3.7 L per acre.

## Application:

Dilute 1 part Reward with 4 parts clean water.

Spray over the water surface.

## How it Works:

Refer to Table 2 on page 29.

## Restrictions:

**Grazing:** Do not use water for animal consumption for 24 hours after application.

**Irrigation:** Do not use water for irrigation for 5 days after application.

**Domestic Use:** Do not use water for human consumption for 5 days after application. Do not swim in water for 24 hours after treatment.

**Storage:** Do not freeze.

**Environment:** If weed growth is dense, protect fish by not treating more than one-fourth of dugout at a time.

## Equipment Clean Out:

Refer to page 14.

## Hazard Rating:

Caution Poison.

Potential Skin Sensitizer
Warning Skin Irritant

# Rustler

### Herbicide Group – 4, 9

*(Refer to page 27)*

## Company:

Monsanto Canada Inc. (PCP#27200)

## Formulation:

194 g/L glyphosate present as the isopropylamine salt. 46 g/L dicamba present as a solution.

Container sizes - 10 L, 115 L.

## Crops and Staging:

Summerfallow.

Preseeding in spring on fields to be sown to wheat, barley, oats and rye.

May also be applied prior to sowing field corn in fields with more than 2.5% organic matter (do not use on sandy or sandy loam soils).

Rustler **SHOULD NOT** be applied prior to broadleaf crops such as lentils, peas, canola and flax due to the risk of injury.

## Weeds, Rates and Staging:

Application should be made to emerged, actively growing weeds. Application at early growth stages generally provides the best results.

**Annual grasses** - Apply 1 L per acre between emergence and heading. For wild oat apply at the 1 to 3 leaf stage.

Downy brome
Persian darnel
Green foxtail
Volunteer cereals
Wild oats

**Annual broadleaves** - Apply 1 L per acre up to 6 inches (15 cm) height unless otherwise indicated.

Cow cockle
Flixweed
Kochia
Lamb's-quarters
Redroot pigweed
Russian thistle
Smartweed (including lady's-thumb)
Stinkweed
Volunteer canola*
Wild buckwheat
  (1 to 4 leaf)
Wild mustard

* NOT including Roundup Ready varieties.

**Foxtail barley suppression**- Apply 1.26 L per acre before initiation of the seed head.

## Cost (2005 suggested retail price):

$6.24 to $7.86 per acre.

## Application Information:

**Water Volume:** 20 to 40 L per acre water. Use of the lower water volume will improve control. Avoid the use of extremely hard water (greater than 700 ppm calcium or magnesium or high levels of iron).

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Reduced effectiveness may result if application is made to weeds that are drought-stressed, damaged by disease or insects. Poor control under cool, cloudy weather can occur. Dust on foliage can also cause reduction in control.

## Tank Mixes:

**Herbicides:**

2,4-D Ester or amine (0.23 to 0.34 L/acre)†* or (0.4 to 0.5 L/acre)†**

* to control volunteer RR canola up to 4 leaf stage

** to control RR canola up to 6 leaf stage.

† Rates listed based on 2,4-D 600 formulations. Multiply rates by 1.2 for 500 formulations and 0.85 for 700 formulations.

## Restrictions:

**Rainfall:** Within 6 hours may reduce weed control. Heavy rainfall within 2 hours of application may require a repeat treatment.

**Grazing:** Do not graze treated areas or cut for feed.

**Recropping:** No restrictions in the season following treatment. Do not apply in fall or spring prior to broadleaf crops such as lentils, peas, canola and flax due to the risk of injury.

**Aerial Application:** Do not apply by air.

**Storage:** Store above 5°C.

**Equipment:** Do not mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

**Environment:** Maintain a minimum buffer zone of 15 m between the downwind edge of the spray boom and non-target plants or wetland areas or other open water. Apply only in light wind conditions. Do not spray when conditions are dead calm or when wind is gusty.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

Warning Skin Irritant
Potential Skin Sensitizer

# Select

## Herbicide Group – 4

*(Refer to page 27)*

**See clethodim on page 85.**

# Sencor

## Herbicide Group – 5

*(Refer to page 27)*

## Company:

Bayer CropScience

## Formulations:

**Sencor Solupak 75 DF (PCP# 20968) :** 75% metribuzin formulated as a dispersible granule. Container size - 2.5 kg (5 water soluble bags, 500 g each).

**Sencor 75 DF (PCP# 17242):** 75% metribuzin formulated as a dispersible granule. Container size - 2.5 and 5 kg.

## Crops, Rates and Staging:

| CROP | APPLICATION TIMING | RATES (g/acre) |
|---|---|---|
| Barley | 2 to 5 leaf stage. | 80 to 152 |
| Spring wheat (including durum) | 2 to 5 leaf stage. | 80 to 111 |
| Winter wheat (Norstar only) | In late fall after tillers have developed (past the 3 leaf stage). | 226 to 304 |
| Peas (field and processing)* | Preplant incorporated (when tank mixed with Edge DC, Rival or Treflan EC) | **Spring:** 152 to 192<br>**Fall:** 190 to 223 |
| Peas (field only)* | Postemergence - up to 6 inches (15 cm) of vine length. For short-statured, determinate flowering peas, apply at the early stages within this range. | 111 to 152 |
| | Split post-emergent applications** | **First split application:** 60 to 80<br>**Second split application:** 7 to 10 days later with rates within these ranges. |
| Lentils* | Single or split applications** to plants up to 6 inches (15 cm) of vine length. For maximum crop tolerance, apply at the 1 to 4 above ground node stage. | 111 |
| | | **First split application:** 60 to 80<br>**Second split application:** 7 to 10 days later with rates within these ranges. |
| Chickpeas* | Up to 2.5 inches (6 cm) in height, when vines have 1 - 3 above ground nodes. Note application past recommended growth stage may result in severe crop injury. | 111 |
| Potatoes (except Belleisle or Tobique)*** | Preplant incorporated (with Eptam). | 152 to 223 |
| | Pre-emergence in sprinkler irrigation systems (apply only in a tank mix with Eptam 8-E) | 152 to 223 |
| Potatoes (except Atlantic, Belleisle, Eramosa, Tobique and red-skinned or early maturing varieties)*** | Early postemergence (up to 4 inches or 10 cm in height). | 151 |
| Soybeans*** | Preplant incorporated (tank mixed with Treflan EC). | 111 to 223 |
| Fababeans | Preplant incorporated (tank mixed with Treflan EC ) | **Spring:** 111 to 223<br>**Fall:** 190 to 223 |

* DO NOT use on lentils, peas or chickpeas seeded less than 2 inches (5 cm) deep or in soils with less than 4 percent organ matter.

** Under certain field or weather conditions a split application may provide better weed control and crop tolerance tha single applications. The first application should be made at the cotyledon to 2 leaf stage of the weeds. The second appl cation should be made when a second flush of weeds have emerged or if weeds which were more advanced at the tin of the first application have started to show regrowth. The split applications are normally 7 to 10 days apart.

*** Consult manufacturer or seed supplier for varietal tolerances to Sencor applications in soybean and potato.

**Note:** When Sencor is tank mixed with Edge or Treflan in peas, fababeans, and soybeans, refer to product label for maximu rates that can be applied on light textured soils.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Post-emergence applications should be made when weeds are small – 2 inches (5 cm) in height or diameter.

Split applications (postemergence on lentils and peas) – 1st application at cotyledon to 2 leaf stage of weeds. 2nd application (if necessary) 7 to 10 days after the first.

**Post-emergence at 81 g/acre:**

***Weeds controlled in spring wheat, barley, field pea and suppressed in lentil and chickpea:***

Chickweed
Green smartweed
Hemp-nettle*
Lamb's-quarters
Stinkweed
Volunteer canola
Wild mustard

***Additional weeds controlled in spring wheat and barley only:***

Lady's-thumb
Redroot pigweed

**Post-emergence at 111 g/acre:**

***Weeds controlled in spring wheat, barley, potato, field pea, and suppressed in lentil and chickpea:***

Weeds above plus:
Ball mustard
Corn spurry
Hemp-nettle
Tartary buckwheat

***Additional weeds controlled in spring wheat and barley only:***

Common groundsel
Night-flowering catchfly
Wormseed mustard

**Post-emergence at 152 g/acre in spring wheat and barley only:**

Weeds above plus:
Henbit
Russian thistle

**Post-emergence at 152 g/acre in potatoes only:**

Weeds listed for peas above plus:
Lady's-thumb
Redroot pigweed
Shepherd's-purse

**Post-emergence in Winter Wheat at 226 to 304 g/acre in winter wheat controls:**

Downy brome
Flixweed
Shepherd's-purse
Stinkweed

**Preplant Incorporated in Fababeans, Lentils, Field Pea, Soybean:**

Must be applied in tank mix with Treflan EC or Rival DF):
Chickweed
Corn spurry
Green smartweed
Hemp-nettle
Lamb's quarters
Stinkweed
Volunteer canola
Wild mustard

Plus weeds controlled by either Rival DF or Treflan EC.

* Use the high rate for best control.

** Suppressed only in lentils and chickpeas.

## Cost (2005 suggested retail price):

$43.06 per L

## Application Information:

**Water Volume:**

***Preplant incorporated:*** 40 L per acre.
***Post-emergence applications:***
Cereals - 40 L per acre.
Lentils, peas, chickpeas - 70 L per acre.

**Pressure:** 30 to 40 psi (200 - 275 kPa).

**Nozzles:** Flat fan nozzles with opening no smaller than 8002 or TK2 with 50 mesh screens. For lentils, peas and chickpeas use nozzles no smaller than 8003 or TK3. Angle nozzles 45° forward.

**Incorporation:** All plant growth and stubble should be thoroughly worked into the soil before treatment. Apply directly to the soil surface. Two incorporations are required at right angles for thorough mixing. The first incorporation must be made within 24 hours of spraying. For fall applications, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve trash; however, both incorporations must be done the recommended depth.

Incorporate with a tandem disc, discer or field cultivator (Vibrashank type). Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions

Crop height reductions or yellowing may occur if high temperatures occur within 48 hours of application. Cold, cloudy weather or frost within 3 days of application will also aggravate injury. If frost occurs, allow 4 to 5 days for crop to recover prior to applying Sencor. Heavy rainfall soon after application to peas, lentils and chickpeas can result in stand reduction on soils with less than 4 percent organic matter.

## Tank Mixes:

**Herbicides:**

***In spring wheat or barley:***
Dicamba, Target, MCPA amine or 2,4-D amine.

***In potatoes (preplant incorporated):***
Eptam 8-E (Required).

***In fababeans (preplant incorporated):***
Treflan EC (Required).

***In soybeans (preplant incorporated):***
Treflan EC (Required).

***In peas:***
Treflan (PPI)
Rival (PPI).
Sencor 75 DF at 77 g/acre plus 0.19 L/acre MCPA sodium salt (300 g/L).

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Sencor label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Allow 5 days between application of Sencor and application of other pesticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 6 hours may reduce control.

**Grazing:** Do not graze treated cereal crops within 30 days of application, or peas and lentils within 70 days of application.

**Preharvest Interval:** Do not harvest barley, wheat or potatoes within 60 days of application. Do not harvest lentils, chickpeas, or field peas within 70 days of application. Do not harvest processing peas within 40 days of application.

**Recropping:** Preplant incorporated treatments may leave a residue in the soil that will affect succeeding crops when using higher rates of product. Do not seed canola, sunflowers, onions, celery, peppers, cole crops, lettuce, spinach, red beets, turnips, pumpkin, squash, cucumbers or melons the year after treatment. Fall seeded crops may be injured when seeded the same year as preplant or post-emergence applications of these products.

**Aerial Application:** No restrictions on label. Reduced weed control and increased crop injury can occur with aerial applications.

**Storage:** May be frozen.

**Environment:** Avoid drift onto sensitive plants and contamination of water or wetland areas.

## Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining spray solution from the spray tank. Rinse the spray tank and refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for 5 minutes and spray out. Repeat this procedure twice. Fill the spray tank with clean water, recycle for 5 minutes, and spray out. Clean pump and nozzle screens thoroughly. Wash away any spray mixture from the outside of the spray tank, nozzles or spray rig.

Do not clean equipment upslope of water bodies or ditc es, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

## Hazard Rating:

Keep out of reach of children.

# Shotgun

**Herbicide Group – 4,5**
*(Refer to page 27)*

## Company:

United Agri Products (PCP#24608)

## Formulation:

280g/L atrazine and 120 g/L 2,4-D ester formulated as suspension concentrate.

Container size - 2 x 10 L.

## Crops and Staging:

Field corn up to the 4 leaf stage.

**NOTE:** The 2,4-D component may cause corn to becom brittle and prone to breaking from strong wind or cultivation for about two weeks following application.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds controlled at the 1 to 6 leaf stage, unless specified:**

Lamb's-quarters
Ragweed (common)
Redroot pigweed
Smartweed (annual)
Wild buckwheat (1 - 4 leaf)
Wild mustard

## Cost (2005 suggested retail price):

$10.59 to 15.57 per acre.

## Rate:

**Broadcast applications:**
Apply at 0.97 L per acre on light textured soils (sandy) and up to 1.46 L per acre on medium to heavy textured soils (silt to clay). One 10 L jug treats 6.8 to 10 acres.

**Band applications:**
Shotgun may also be applied in a band over the crop row if another method will be used to control weeds between rows. For band treatment, use proportionately less; for example, for 10 inch band on 30 inch row, use 1/3 of the broadcast rate over the total area covered by the sprayer.

Make only one application per year.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 to 81 L per acre.

**Pressure:** 35 to 40 psi (240 to 275 kPa)

**Nozzles:** Use flat fan nozzles that deliver a uniform coverage while minimizing fine droplets prone to drift. Banding applications require special even flat fan nozzles, designed to deliver an even spray pattern across the band. Use 50 mesh or larger screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

This product should be applied when the temperature is about 10° to 28°C for optimum results. Cooler temperatures delay or reduce its effectiveness and higher temperatures increase the risk of vapour movement to susceptible crops. Do not apply when there is a risk of severe fall in night temperature. Weed control and crop tolerance will be best when plants are not subjected to excessive moisture or drought stress before and after application.

If conditions are very dry, do not spray until one week after rain.

## Tank Mixes:

**Herbicides:**
Accent (13.5 g/acre) plus recommended adjuvant
Ultim (13.5 g/acre) plus recommended adjuvant
– Manitoba only.

**Fertilizer:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

Do not add any other adjuvants, surfactants, oils, fertilizers or other pesticides to the spray mixture.

**Note: The above mixes are those listed on the Shotgun label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Rainfall within 6 hours may reduce control. A 24 hour rainfree period is preferred.

**Grazing:** Do not harvest forage or graze fields until ear emergence of the corn.

**Preharvest Interval:** No information.

**Recropping:** Under good moisture conditions most rotational crops may be planted the season following application. When extended periods of dry weather occur during the year of treatment, injury may occur to dry beans, peas or other legumes.

**Aerial Application:** Do not apply by air.

**Storage:** Do not store below -10°C. If frozen, warm to 5°C or more and reconstitute by shaking or rolling container.

**Environment:** Avoid drift onto non-target areas. To avoid contamination, leave a buffer of 10 meters from the sprayed area to water bodies, wetland areas and plants that may be injured by Shotgun. Do not mix within 30 m of these areas. Do not spray near sensitive crops when winds are gusty or in excess of 8 km/h and moving towards sensitive crops.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison.

Danger Eye Irritant.

Caution Skin Irritant.

Keep out of reach of children.

# Simazine

**Herbicide Group - 5**
*(Refer to page 27)*

## Company:

Syngenta (Princep Nine-T - PCP#16370)
United Agri Products (Simazine 480 - PCP#23181)

## Formulations:

**Princep Nine-T:** 90% simazine formulated as a water dispersible granular. Container size - 5 kg.

**Simazine 480:** 500 g/L simazine formulated as a flowable liquid. Container size – 2 x10L.

## Crops and Staging:

Established alfalfa or bird's-foot trefoil (Princep Nine-T only).

Do not use in year of seeding. Apply after final cut in fall until freeze-up. Do NOT apply to the same field more than three consecutive years. Residues may build up with yearly applications.

Established shelterbelts (elm, caragana, green ash, Manitoba maple). - fall or early spring before weeds begin growth. Injury may occur to shelter belts growing under saline conditions.

Do NOT apply to frozen ground.

## Weeds and Staging:

Simazine is applied prior to the emergence of the weeds and kills them when they are exposed to the treated layer of soil.

- Barnyard grass
- Lamb's-quarters
- Perennial species starting from seed
- Purslane
- Ragweed
- Smartweed (including lady's-thumb
- Volunteer clovers
- Wild buckwheat
- Wild oats
- Yellow foxtail

## Cost (2005 suggested retail prices):

Princep Nine-T – $16.60 per kg

Simazine liquids - $11.13 per L

## Rates:

**Forage crops:**
Princep Nine-T - 0.45 kg/acre.

**Shelterbelts:**
Princep Nine-T - 2 to 3 kg/acre,
Simazine 480 – 3.64 to 5.46 L/acre

## Application Information:

**Water Volume:** Minimum 121 L per acre. In shelterbelts, use a minimum of 202 L per acre.

**Pressure:** 30 to 45 psi (200 to 300 kPa ).

**Nozzles:** Flat fan nozzles with 50 mesh or coarser nozzle screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

When applying to forage stands, dry soil conditions at the time of weed emergence may result in reduced weed control.

## Tank Mixes:

None registered.

**Note: The above mixes are those listed on the simazine labels only. For additional mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Moderate rainfall after application enhances activity.

**Grazing:** In forage stands, allow 30 days between application and grazing, 60 days between application and cutting for feed.

**Recropping:** Simazine is persistent and residues may persist for several years depending on soil pH, available soil moisture, number of yearly applications, and the sensitivity of the following crop. Corn will tolerate soil residues of simazine and may be planted the year of application.

White beans, onions, peas may be injured 12 month after application.

**Aerial Application:** Do not apply by air.

**Storage:** May be frozen. Store in a cool, dry place.

**Environment:** Do not use within 10 m of wells, wetlands, or other open water. Do not mix within 30 m of these areas.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison. (Simazine 480)

# Solo

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

BASF Canada (PCP#25496)

## Formulation:

70% imazamox as a water dispersible granule.

Container size - 4 x 117 g water soluble bags.

## Crops and Staging:

Field peas - 1 to 6 above-ground nodes (1 to 6 true leaves).
CLEARFIELD canola - 2 to 6 leaf stage.

Temporary crop yellowing may be observed shortly after application in field peas and CLEARFIELD canola.

## Weeds and Staging:

**Grasses - 1 to 4 main stem leaves, early until tillering.**

Barnyard grass
Green foxtail
Volunteer barley and wheat (non-Clearfield varieties)
Wild oats

**Broadleaf Weeds - cotyledon to 4 leaf stage.**

Cleavers*
Cow cockle
Green smartweed
Kochia*
Lamb's-quarters
Redroot pigweed
Shepherd's-purse
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Wild buckwheat*
Wild mustard

* Suppression.

## Rates:

**Solo:** 11.7 g/acre (40 acres per case)

**Merge Adjuvant** (sold separately): Merge must be used with Solo at a rate of 0.5 L of Merge per 100 L of total mixed spray solution.

Do not apply Solo more than once per year. Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13.

## Cost (2005 suggested retail price):

N/A

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan. Use 50 mesh or coarser filter screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

No information provided on the product label. Plants are under stress when conditions before or after application are very hot or cold, or excessively dry or wet. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** Do not spray if there is a forecast of rain during or soon after application as it may reduce control.

**Grazing:** Do not graze treated crop or cut for feed within 20 days of application.

**Preharvest Interval:** Do not apply within 60 days of harvest.

**Recropping:** Field peas, oat, barley and spring wheat (including durum) may be seeded the first spring after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above. Contact manufacturer for additional information on recropping intervals.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze. Store in a cool, dry place above 5° C.

**Environment:** Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 11 m between the outside boundary of the sprayed area and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Warning Eye and Skin Irritant

# Spectrum

**Herbicide Group – 2,4**
*(Refer to page 27)*

## Company:

Dow AgroSciences

## Formulation:

Each case of Spectrum contains 2 components:

**Spectrum A (PCP#27031):** 50 g/L florasulam formulated as a suspension concentrate.

**Spectrum B (PCP#27032):** 50 g/L clopyralid and 280 g/L of MCPA ester formulated as an emulsifiable concentrate.

Container size- Spectrum A - 0.8 L, Spectrum B - 12 L.

## Crops and Staging:

Spring wheat (including durum), barley and oats in the 2 to 6 leaf stage.

## Weeds and Staging:

**Broadleaf weeds controlled at the 2 to 4 leaf stage:**

Canada thistle
Chickweed
Cleavers
Dandelion**
Flixweed*
Hemp-nettle
Lamb's-quarters
Redroot pigweed
Shepherd's-purse
Smartweed
Sow-thistle (annual)
Sow-thistle (perennial)†
Stinkweed
Stork's-bill
Volunteer canola
(all varieties)
Wild mustard
Wild buckwheat

**Broadleaf weeds suppressed:**

Dandelion***

* spring seedlings only
** seedlings and overwintered rosettes < 15 cm
*** overwintered rosettes > 15 cm; mature plants
† top growth control only

## Cost (2005 suggested retail price):

$14.00 per acre.

## Rate:

**Spectrum A:** 40 mL/acre

**Spectrum B:** 600 mL/acre

One case treats 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13 of the Guide to Crop Protection.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Use nozzles capable of delivering appropriate pressures and volumes.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of Spectrum. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and regrowth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at, or following time of application, may increase the risk of crop injury at all stages of growth.

## Tank Mixes:

**Herbicides:**

***In spring wheat (including durum) and barley:***

Assert (0.65 L/acre) plus Acidulate

Puma$^{120}$ Super at 0.155 L/acre* or 0.31 L/acre.**

***In spring wheat (including durum) only:***

Everest (17.4 g/acre) plus non-ionic surfactant

Horizon (93 mL/acre or 117 mL/acre) plus Score Adjuvant.**

* For control of green foxtail only

**This tank-mix may cause a reduction in wild oat control.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Spectrum label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze treated crop or cut for feed within 7 days of application.

**Pre-harvest:** Do not apply within 60 days of harvest.

**Recropping:** Barley, canola, field peas*, oats and wheat may be grown the year following an application or the field can be summerfallowed.

** Do not seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.*

**Aerial Application:** Do not apply by air.

**Storage:** Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

**Environment:** Spray when winds are under 15 km/hr, but not dead calm. Leave at least 30 m between the downwind edge of the spray boom and the closest edge of non-target land areas such as shelterbelts, hedgerows and shrublands. Leave at least 5 m between the downwind edge of the boom and the closest edge of water and wetland areas such as ponds, streams, rivers, prairie potholes and sloughs.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

May cause eye irritation

# Sundance

**Herbicide Group – 2**
*(Refer to page 27)*

## Company:

Monsanto Canada Inc.

## Formulation:

**Sundance (PCP#25826):** 75% sulfosulfuron formulated as a water dispersible granule.
Container size – 432g per case.

**Merge Adjuvant (PCP#24702):** – 8 L.

**pH adjuster:** 7% ammonium hydroxide solution.
Container size: 4L jug.

## Crop and Staging:

Spring wheat (including Avonlea, Kyle, Morse and Plenty durum) prior to emergence of the 4th tiller. (Do not underseed forage legumes).

## Weeds and Staging:

**Wild oat:** From emergence to the 6 leaf stage with no more than 3 tillers. For optimum weed control and crop yield, apply prior to tillering.

**Green foxtail*:** emerged but prior to heading.

**Annual Broadleaf weeds:** cleavers, common chickweed, redroot pigweed, stinkweed, volunteer canola (NOT including CLEARFIELD canola), wild mustard - Apply to the seedling stage for optimum weed control.

**Perennial Grass and Broadleaf weeds:** dandelion**, foxtail barley, perennial sow-thistle**, quack grass* - Prior to heading/flowering when plants are actively growing

* Suppression only
** Spring seedlings are controlled and established plants are suppressed.

## Cost (2005 suggested retail price):

$15.50 per acre including adjuvant.

## Rates:

**pH adjuster:** 1 L per 400 L of spray solution.

**Sundance:** 11g per acre (40 acres per case)

**Merge:** 0.2 L per acre.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 20 to 40 L per acre.

**Pressure:** 40 psi (275 kPa)

**Nozzles:** Flat fan. Choose nozzles that provide optimum spray distribution and coverage at the appropriate spray pressure. Do not use flood jet or controlled droplet application equipment.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

For optimum results, do not apply to weeds growing under stress.

## Tank Mixes:

**Herbicides:**

2,4-D ester (500 g/L formulation) at 0.340 L/acre for additional control of lamb's-quarters, wild buckwheat, volunteer CLEARFIELD canola, stork's-bill, dandelion**, narrow-leaf hawk's-beard**, kochia, annual smartweed spp., and perennial sow-thistle**.

Pardner at 0.4 L / acre for additional control of weeds controlled by Pardner plus narrow-leaf hawk's-beard**.

MCPA ester (500 g/L formulation) at 0.385 L/acre for additional control of weeds listed on MCPA ester label plus narrow-leaf hawk's-beard***, wild radish, volunteer sunflower, common plantain, and wild buckwheat*.

Buctril M at 0.405 L/acre for additional control of those weeds listed on the Buctril M label plus dandelion**, hemp-nettle, velvetleaf, Canada thistle* and perennial sow-thistle*.

* Suppression only
** Control of spring seedlings and season-long control of established plants.
*** Spring Seedlings only

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note: The above mixes are those listed on the Sundance label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Do not apply if rain is forecast during, or soon after, application.

**Grazing:** Do not graze in the year of treatment.

**Pre-harvest interval:** No information available on label. Contact manufacturer for information.

**Recropping:**

***Soils with GREATER than 4% organic matter:***

| | |
|---|---|
| Normal Moisture conditions | Wheat (including durum), canola (all varieties), barley, peas and flax may be grown the season after application. |
| Under Drought conditions* | Seed only wheat or Clearfield canola the season following application. The crops listed above can be seeded the second season following application. |

***Soils with LESS than 4% organic matter:***

| | |
|---|---|
| Normal Moisture conditions | Wheat (including durum), and Clearfield canola may be seeded one season after application. In the second season after application, barley, canola (all varieties), peas and flax may be grown in addition to the crops above. |
| Under Drought conditions* | Seed only wheat (including durum) or Clearfield canola for two seasons following application. Barley, canola (all varieties), peas and flax as well as the crops listed above can be seeded the third season following application. |

* Drought conditions (less than 80% of normal June to Sept. rainfall) for high pH soils (greater than 7.5) and severe drought (less than 65% of normal June to Sept. rainfall) for all soils.

Re-seed only to wheat in the year of application. For all other crops, allow the most severe restriction for the soil and moisture conditions and conduct a field bioassay prior to planting.

**Aerial Application:** Do not apply by air.

**Storage:** Store under cool, dry conditions (below 50° C) away from foodstuffs, feed or seed.

**Environment:** Do not apply to water or contaminate water when draining sprayer. Maintain a buffer zone of 30m between the last spray swath and the edge of sensitive areas (shelterbelts, wood lots, or gardens). Leave a buffer zone of 6m between the last spray pass and wetlands or ponds. Use precautions to AVOID DRIFT. Drift may cause soil residues that will injure subsequent crops.

## Tank Cleaning:

Do not drain or clean sprayer in an area where wastewater may drain into wells, other water bodies, or surrounding desirable vegetation. Flush tank, boom, and hoses with clean water for a minimum of ten minutes to remove all visible residues of the product. Fill the tank with water and add 1 L of household ammonia (minimum 3% ammonia content) per 100 L of rinse water and agitate. Flush solution through booms and hoses then top up tank with clean water. Agitate for 15 minutes, flush the hoses and booms again and then drain the tank. Remove nozzles and screens and clean separately with the ammonia solution as above. Repeat the ammonia rinse procedure as above. Thoroughly rinse the tank with clean water for at least 5 minutes, flush water through hoses and booms, and drain. Dispose of wash solution by spraying in a waste area or on the treated field.

For additional information, refer to page 14.

## Hazard Rating:

**Sundance:** Slight skin irritant

**Merge adjuvant:** Warning Poison; skin irritant

**pH adjuster:** Caution corrosive

## Target/Sword

**See dicamba+mecoprop+MCPA section on page 91**

## Thumper

**See Bromoxynil + 2,4-D Ester section on page 80**

## Tordon 22K

**Herbicide Group – 4**
*(Refer to page 27)*

### Company:

Dow AgroSciences (PCP#9005)

### Formulation:

240 g/L picloram acid present as a potassium salt, formulated as a solution.

Container size - 2 X 10 L jugs

### Crop and Staging:

Apply at any stage of permanent grass pastures, rangeland and non-cropland.

### Weeds, Rates and Staging:

For the control of biennial and deep-rooted perennial weeds listed below:

| **Weed** | **Rate L/Acre** | **Backpack (mL of Tordon 22K per 100 square metres)*** |
|---|---|---|
| Scentless chamomile | 0.445 | 11 |
| Knapweed (diffuse, spotted) | 0.910 | 22 |
| Canada thistle, pasture sage, poverty weed, Russian knapweed, perennial sow-thistle | 1.8 | 45 |
| Leafy spurge, field bindweed, toadflax | 3.6 | 90 |

* mix with 18 litres of water and the spray solution over 100 square metres.

For best results, applications should be made when perennial weeds have fully developed, green leaves. Application in late summer (or periods of dry weather) when plants are not actively growing may result in unsatisfactory control.

## Cost (2005 suggested retail price):

$41.30 per L

Only available through Dow AgroSciences trained agents. Contact Dow AgroSciences for further information.

Application Information:

**Water Volume:** 160 to 325 L per acre.

**Pressure:** 150 to 350 kPa (20 to 50 psi).

**Nozzles:** Flat fan recommended. Non-target broadleaf plants are very sensitive to picloram drift.

Avoid conditions that are conducive to drift. (See page 12 for drift control suggestions)

## How it Works:

Picloram interferes with cell division, causing leaf cupping, stem distortion and eventual death. Picloram is absorbed through the leaves and roots.

**IMPORTANT: Picloram is a very persistent and water-soluble herbicide. Treated soil should not be moved from the treated area. Do not apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. Do not apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. If shallow aquifers are present, do not apply Tordon 22K.**

Tordon 22K must not be applied on range and pasture acres that are irrigated. Do no compost or mulch clippings from grass treated with Tordon 22K.

## Effects of Growing Conditions:

Avoid spraying if temperatures exceed 28°C.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** Rain within 6 hours of application may cause poor results. Heavy rainfall may dissolve and carry picloram away from the target area, or it may leach dissolved picloram out of the root zone or to undesirable locations.

**Grazing:** Do not graze lactating dairy animals within 6 weeks after treatment. There are no grazing restrictions for other livestock. Do not use manure from animals grazing treated forage to fertilize susceptible plants or crops.

**Recropping: Tordon 22K may persist in the soil for up to 5 years.** For this reason Tordon 22K may only be applied on permanent grass pastures and rangeland unless applied by an authorized pesticide applicator. Avoid the root zone of desirable trees or shrubs.

**Aerial Application:** Do not apply by air.

**Storage:** Do not freeze.

**Environment:** This product is moderately toxic to fish. Apply this product well back from any water bodies to avoid contamination. Heavy rains can move this product from its application site down slope toward sensitive areas. Do not load or mix near wells, dugouts or other water bodies.

## Tank Cleaning:

Tordon 22K can cause severe injury to sensitive crops (especially pulses and other broadleaf crops) at very low concentrations. Spray equipment should be flushed out immediately after spraying Tordon 22K. The manufacturer recommends that equipment should be flushed twice with a water/household ammonia rinse (1 L of 3% ammonia per 100 L of water). All nozzles screens and filters should be removed and cleaned after use. Do not clean equipment upslope of water bodies or ditches near crop-land or shelterbelts.

Refer to page 14 for additional information.

## Hazard Rating:

Caution Poison.

# Trifluralin

**Herbicide Group – 3**
*(Refer to page 27)*

**(Summerfallow use in the brown soil zone of Saskatchewan)**

## Company:

Dow AgroSciences (Advance 10G, Treflan QR5)
Nufarm Agriculture (Rival 10G)
United Agri Products (Bonanza 10G)

## Formulation:

**Advance 10G (PCP#21742):** 10% trifluralin formulated as a granular in 22.7 kg and 454 kg bags.

**Bonanza 10G (PCP# 22744):** 10% trifluralin formulated as a granular in 22.7 kg, 500 kg bags.

**Rival 10G (PCP#18926):** 10% trifluralin formulated as a granular in 22.7 kg, 567 kg bags.

**Treflan QR5 (PCP#14545):** 5% trifluralin formulated as a granular in 25 kg, 725 kg bags.

## Crops and Staging:

Spring wheat (including durum) in the brown soils zone of Saskatchewan. **Not for use in Manitoba.**

Apply to summerfallow in May, June, or July for weed control during both years of a fallow-wheat rotation or in the fall (September or October) or spring prior to wheat seeding. Do not apply to stubble when the previous crop was treated with another trifluralin product (Treflan, Advance, Rival or Bonanza). This includes application the previous summer or fall. Do not apply trifluralin to stubble or fallow when the previous year's crop was an oilseed, barley or pulse crop treated with a deep incorporated, spring or fall applied trifluralin product.

## Weeds and Staging:

The followed weeds will be controlled prior to emergence:

**Fallow Year:**
Green foxtail
Wild oat†
Persian darnel
Barnyard grass
Russian thistle*
Wild buckwheat
Cow cockle
Lamb's-quarters
Redroot pigweed

**Crop Year:**
Green foxtail
Wild oat *
Lamb's-quarters
Wild buckwheat *

* Suppression only
† Suppression only with Advance 10G

## Cost (2005 suggested retail price):

**Advance 10G:** $3.46 per kg.
**Bonanza 10G:** $3.06 per kg.
**Rival 10G:** $3.13 per kg.
**Treflan QR5:** $1.88 per kg.

## Rates:

| | **RATE (KG/ACRE)** | | | |
|---|---|---|---|---|
| | **5G Formulations** | | **10G Formulations** | |
| **Soil Organic Matter (%)** | **1 to 3** | **4 to 8** | **1 to 3** | **4 to 8** |
| May | 7.7 | 9 | 3.85 | 4.5 |
| June | 6.5 | 7.7 | 3.25 | 3.85 |
| July | 5.3 | 6.5 | 2.65 | 3.25 |
| | **2-8% Organic Matter** | | | |
| September to October | 4.5* | | 2.75* | |
| Spring (April or May, in the year of seeding) | 4.5* | | 2.75* | |

* Control of green foxtail only.

During the fallow year, susceptible weeds may not be fully controlled until after the second fallow operation has established a uniform layer of treated soil. Control of wild oats in the crop year may be variable depending on wild oat population as well as soil and climatic conditions. Some wild buckwheat may escape but its growth will be retarded and result in limited competition to the wheat crop.

## Application:

Do not apply to sandy soils with less than 1% organic matter. Application to severely eroded knolls is not recommended. Do not apply to wet soils, soils in poor working condition, soils which contain more than 8 percent organic matter, or soils subject to prolonged periods of flooding.

Granules may be applied to standing or pre-worked stubble, provided trash or green growth does not interfere with cultivation (prevent soil mixing).

Over-application caused by overlapping, improper calibration or non-uniform application may result in reduced crop stand, delayed development or reduced yields.

Close applicator lid after filling to avoid prolonged exposure to direct sunlight.

## Incorporation:

**May - July:** Apply granules to the soil surface and incorporate immediately, in the same operation if possible. Do not delay incorporation more than 24 hours after application. Use a deep tillage cultivator, field cultivator or disc implement set to work 2 to 3 inches (5 to 8 cm) deep, and operating at 8 to 10 km/hr. A second incorporation at the same depth and at an angle to the first should be done when weed growth requires it. Wait at least one week before making the second incorporation. After completing two fallow incorporations, additional operations with a rod weeder, shallow tillage or fall 2,4-D application may be required to control remaining weed growth.

**September - October:** Apply granules after harvest until freeze-up and incorporate immediately, in the same operation if possible with a deep tillage cultivator, field cultivator or disc implement set to work 2 to 3 inches (5 to 8 cm) deep. Do not delay incorporation more than 24 hours after application. A second incorporation may be done in the fall a minimum of 3 days later. Alternatively, in order to conserve trash cover throughout the winter, the second incorporation can be completed in the spring at the same depth and at an angle to the first incorporation. When both incorporations take place in the fall, shallow spring tillage should be completed in the spring. If a discer or air seeder is used for seeding, separate spring tillage may not be necessary.

Granules should not be incorporated when soil is crusted, lumpy or too wet for good mixing action. Fall application is not recommended on soils where a lack of trash cover combined with the required incorporation would leave the soil vulnerable to erosion.

**Spring (April - May):** Apply granules and incorporate immediately, in the same operation if possible. Do not delay the first incorporation more than 24 hours after application. The second incorporation must be delayed a minimum of 3 days following the first incorporation.

When applied to cold soils, wait 14 days before making second incorporation. The second incorporation should be done at an angle to the first incorporation, and at the same depth. If a discer or air seeder is used for seeding, the seeding operation can be used as the second incorporation.

## Seeding:

Allow soil to warm before seeding to reduce risk of injury to crop. Place seed 1.25 to 2.5 inches (3 to 6 cm) deep. If spring seedbed preparation is required, set cultivator 2 inches (5 cm) deep. To reduce the risk of wheat injury, use good quality seed and agronomic practices that will promote good growing conditions. Avoid deep seeding, loose seedbeds and seeding into cold soils. If extended dry periods were present after a fallow application, a 10 percent increase in seeding rate is recommended.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Prolonged drought conditions after a May-July application to fallow may result in higher levels of trifluralin in the soil at the time of seeding. If conditions are not conducive to rapid emergence and growth of the wheat crop (for example cold or dry soil conditions) injury can occur.

## Restrictions:

**Rainfall:** Once the product is incorporated into the soil, rainfall has no effect.

**Grazing:** Do not graze or cut for hay; insufficient data to support such use.

**Recropping:** Oats, canaryseed and small seeded forage grasses such as timothy and creeping red fescue should not be grown in rotation following a trifluralin treated crop.

**Aerial application:** Do not apply by air.

**Storage:** Store in a cool, dry location, out of direct sunlight.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Keep out of reach of children.

# Trifluralin (Green and Yellow Foxtail Control in Cereals)

**Herbicide Group – 3**
*(Refer to page 27)*

## Company:

Dow AgroSciences (Advance, Treflan)
Nufarm Agriculture (Rival)
United Agri Products (Bonanza)

## Formulations:

**Advance 10G (PCP#21742):** 10% trifluralin formulated as a granular in 22.7 kg and 454 kg bags.

**Bonanza 10G (PCP#22744):** 10% trifluralin formulated as a granular in 22.7 kg and 500 kg bags.

**Bonanza 400 (PCP#21967):** 400 g/L trifluralin formulated as an emulsifiable concentrate in 10 L, 115 L, 205 L containers.

**Rival 10G (PCP#18926):** 10% trifluralin formulated as a granular in 22.7 kg, 567 kg bags.

**Rival EC (PCP#18612):** 500 g/L trifluralin formulated as an emulsifiable concentrate in 9 L, 110 L, 200 L, 900 L containers.

**Treflan EC (PCP#23933):** 480 g/L trifluralin formulated as an emulsifiable concentrate in 9.45 L, 115 L containers.

**Treflan QR5 (PCP#14545):** 5% trifluralin formulated as a granular in 25 kg, 725 kg bags.

## Crops and Staging:

Liquids applied in spring only (after seeding but prior to crop emergence) - spring wheat (including durum), barley.

Granulars applied in fall only (after September 1 but before freeze-up) - spring wheat (including semi-dwarf and durum).

## Weeds and Staging:

Pre-emergent control of green and yellow foxtail.

## Rates:

**LIQUIDS**

| PRODUCT | RATES (L/ACRE) | |
|---|---|---|
| | LIGHT AND MEDIUM SOIL TEXTURE | HEAVY SOIL TEXTURE |
| Rival EC | 0.49 to 0.57 L | 0.65 L |
| Treflan EC | 0.49 L | 0.69 L |
| Bonanza 400 | 0.57 L | 0.85 L |

**GRANULARS (WHEAT ONLY)**

| PRODUCT | RATES (KG/ACRE) |
|---|---|
| | All soils (2 - 8% organic matter) |
| Advance 10G/Rival 10G/Bonanza 10G | 2.23 |
| Treflan QR5* | 4.45 |

*Spring applications of Treflan QR5 may also be made at the same rate during the months of April and May only in soils between 2 to 6% organic matter.

## Cost (2005 suggested retail prices):

**Advance 10G:** $3.46 per kg.
**Bonanza 400:** $11.86 per L.
**Bonanza 10G:** $3.06 per kg.
**Rival EC:** $13.83 per L.
**Rival 10G:** $3.13 per kg.
**Treflan EC:** $14.97 per L.
**Treflan QR5:** $1.88 per kg.

## Application Information:

**Water Volume:** Minimum 40 L per acre - liquid formulations only.

**Pressure:** 40 psi (275 kPa) - liquid formulations only.

**Nozzles:** Flat fan - liquid formulations only.

**Incorporation:**
***Liquid formulations:*** Apply and incorporate in spring just after seeding. Incorporate to a depth of 1 to 1.5 inches (2 to 4 cm) into a trash free soil (80 percent black when viewed from above) using diamond or tyne type harrows operated at a speed of 6 mph (9 km/h). Incorporate twice, with the second incorporation at right angles to the first. The first incorporation should be performed immediately in the same direction of application. Both incorporations should be done within 24 hours of application. When tank mixing liquid formulations with Avadex BW, follow the same incorporation procedure.
***Granular formulations:*** May be applied to standing or pre-worked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. Incorporate with cultivators or disc implements only. Perform the first tillage operation within 24 hours of application. Incorporate at a working speed of 5 to 8 mph (8 to 13 km/hr) and to a depth of 2 to 3 inches (5 to 8 cm). Wait a minimum of 5 days, then incorporate a second time at right angles to the first. This second incorporation may be delayed until the following spring. Subsequent working should be no deeper than 2 to 3 inches (5 to 8 cm).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

When using fall applications of the granular formulations, crop injury will occur if soil conditions are not conducive to rapid wheat emergence (for example, cold or dry soil conditions). Weed control is best when soil moisture conditions are good.

Rainfall has no direct effect on product activity. Flooding (3 to 5 days) will cause the rapid breakdown of the product, resulting in reduced weed control. Flooding for 3 weeks or more will result in total product breakdown and loss of weed control.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizer:** Liquid trifluralin may be applied with liquid fertilizer (for example 28-0-0) as a carrier. Conduct a compatibility test before mixing.

**Insecticides:** None registered.

**Note: The above mixes are those listed on the trifluralin labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** None. Flooding can reduce weed control.

**Grazing:** Do not graze the treated crop or cut for feed prior to crop maturity.

**Aerial Application:** Do not apply by air.

**Recropping:** Do not sow tame oats, canaryseed or small seeded forage grasses one year after spring applications or 21 months after fall applications.

**Storage:** Granular formulations must be stored in a cool, dry location, out of sunlight.

Rival EC - Do not store below 5°C.
Treflan E.C. - Do not freeze.
Bonanza 400 - Do not freeze.

Recommendations for liquid formulations: Crystalization of the active ingredient may occur at less than 5°C. To reconstitute, bring temperature to 15°C and shake well until no crystals are visible. This should be done before adding to the spray tank.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Keep out of reach of children.

# Trifluralin (Broadleaf and Grassy Weed Control)

**Herbicide Group – 3**
*(Refer to page 27)*

## Company:

Dow AgroSciences (Advance, Treflan)
Nufarm Agriculture (Rival)
United Agri Products (Bonanza)

## Formulations:

**Advance 10G (PCP#21742):** 10% trifluralin formulated as a granular in 22.7 kg and 454 kg bags.

**Bonanza 400 (PCP#16929):** 400 g/L trifluralin formulated as an emulsifiable concentrate in 10 L, 115 L, 205 L containers.

**Bonanza 10G (PCP#22744):** 10% trifluralin formulated as a granular in 22.7 kg, 500 kg bags.

**Rival EC (PCP#18612):** 500 g/L trifluralin formulated as an emulsifiable concentrate in 9 L, 110 L, 200 L, and 900 L containers.

**Rival 10G (PCP#18926):** 10% trifluralin formulated as a granular in 22.7 kg, 567 kg bags.

**Treflan EC (PCP#23933):** 480 g/L trifluralin formulated as an emulsifiable concentrate in 9.45 L, 115 L containers.

**Treflan QR5 (PCP#14545):** 5% trifluralin formulated as a granular in 25 kg, 725 kg bags.

## Crops and Staging:

Certain formulations are not registered for all the crops listed here. Refer to the specific product label for details. All products are for pre-plant incorporated use only.

**Spring applied liquid, dry flowable or granular formulations** - canola, peas, sunflowers, safflower (liquid formulations), dry beans, mustard, fababeans, alfalfa, sainfoin, sweet clover, soybeans, forage legumes (cicer milk-vetch, seedling alsike clover, red clover, bird's-foot trefoil).

**Fall applied granular formulations** - canola, peas, sunflowers, dry beans, mustard, fababeans, soybeans, barley, lentils and flax.

**Trifluralin liquids** - prior to planting shelterbelt transplants (elm, caragana, green ash, Scots pine).

## Weeds and Staging:

For pre-emergent control of the following species:

Annual brome species
(downy, Japanese)
Barnyard grass
Chickweed
Cow cockle
Green foxtail
Knotweed
Lamb's-quarters
Persian darnel
Pigweed
Purslane
Wild buckwheat*
Wild oats†*
Yellow foxtail

* Some plants may escape herbicide treatment but are not competitive with the crop.

† Suppression Treflan EC and Advange 10G only

## Costs (2005 suggested retail prices):

**Advance 10G:** $3.46 per kg.
**Bonanza 400:** $11.86 per L.
**Bonanza 10G:** $3.06 per kg.
**Rival EC:** $13.83 per L.
**Rival 10G:** $3.13 per kg.
**Treflan EC:** $14.97 per L.
**Treflan QR5:** $1.88 per kg.

## Rates:

**For use in canola, peas, sunflowers, dry beans, mustard, fababeans, seedling alfalfa (spring only), seedling sweet clover (spring only), soybeans.**

| PRODUCT | SOIL TYPE | | | |
|---|---|---|---|---|
| | **Light soils with less than 6% organic matter** | | **Medium to heavy soils with 6 to 15% organic matter** | |
| | Spring | Fall | Spring | Fall |
| Advance 10G | Not registered | 4.45 kg/acre | Not registered | 5.67 - 6.88 kg/acre |
| Rival EC | 0.65 L/acre | 0.89 L/acre* | 0.89 - 1.13 L/acre | 1.13 - 1.37 L/acre* |
| Rival 10G | 3.43 kg/acre** | 4.45 kg/acre | 4.45 - 5.67 kg/acre** | 5.67 - 6.88 kg/acre |
| Treflan EC | 0.69 L/acre | 0.93 L/acre* | 0.93 - 1.21 L/acre | 1.21 - 1.37 L/acre* |
| Treflan QR5 | 6.9 kg/acre** | 8.9 kg/acre | 8.9 - 11.3 kg/acre** | 11.3 - 13.8 kg/acre |
| Bonanza 10G | Not registered | 4.45 kg/acre | Not registered | 5.67 - 6.88 kg/acre |
| Bonanza 400 | 0.81 L/acre | 1.11 L/acre* | 1.11 L/acre | 1.42 L/acre* |

* Although liquid formulations are registered for fall application, this use is not recommended as tillage requirements before and after application will predispose fields to erosion.

** Spring applications of granular formulations are recommended for Manitoba only.

For use in barley (fall only), apply:

| PRODUCT | SOIL TYPE | | | | | |
|---|---|---|---|---|---|---|
| | **2 to 4% organic matter** | | **4 to 6% organic matter** | | **6 to 10% organic matter** | |
| | **Light Soil Texture*** | **Medium to Heavy Soil Texture**** | **Light Soil Texture*** | **Medium to Heavy Soil Texture**** | **Light Soil Texture*** | **Medium to Heavy Soil Texture**** |
| Advance 10G | 3.44 kg/acre | 4.45 kg/acre | 4.45 kg/acre | 5.67 kg/acre | Not recommended | Not recommended |
| Rival 10G, Bonanza 10G | 3.44 kg/acre | 3.44 kg/acre | 4.45 kg/acre | 4.45 kg/acre | 4.45 kg/acre | 5.67 kg/acre |
| Treflan QR5 | 6.9 kg/acre | 8.9 kg/acre | 8.9 kg/acre | 11.3 kg/acre | Not recommended | Not recommended |

* Light textured soils can be defined as Sandy to Sandy loam.

** Medium to Heavy textured soils can be defined as loam to clay.

## Rates: continued

For use in flax or lentils (fall only), apply:

| PRODUCT | SOIL TYPE | | | |
|---|---|---|---|---|
| | Soils with 2 to 6% organic matter | | Soils with 6 to 15% organic matter | |
| | Light Soil Texture* | Medium-Heavy Soil Texture** | Light Soil Texture* | Medium-Heavy Soil Texture** |
| Advance 10G, Rival 10G, Bonanza 10G | 4.45 kg/acre | 4.45-5.6 kg/acre*** | 5.67 kg/acre | 5.67-6.88 kg/acre |
| Treflan EC | 0.93 L/acre | 1.21 L/acre | 1.21 L/acre | 1.21-1.38 L/acre |
| Treflan QR5 | 8.9 kg/acre | 11.3 kg/acre | 11.3 kg/acre | 11.3-13.8 kg/acre |

* Light textured soils can be defined as Sandy to Sandy-loam.
** Medium to Heavy textured soils can be defined as loam to clay.
*** Rates vary among products. Refer to product label for specific information.

## Application Information:

**Water Volume:** Minimum 40 L per acre (liquid products only).

**Pressure:** 40 psi (275 kPa) (liquid products only).

**Nozzles:** Flat fan (liquid products only).

**Incorporation:** Granular formulations are recommended for use in fall or spring as a pre-plant incorporated treatment on broadleaf crops listed on the product label. The liquid formulations should be used only on soils free of lumps and relatively trash-free (75% black) and are recommended only for spring use. Granular formulations may be applied to standing or pre-worked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. Do not use liquid or formulations of trifluralin as a pre-plant incorporated treatment in barley, as severe injury will result. Only the fall applications of Advance 10G, Rival 10G, Bonanza 10G or Treflan QR5 are registered for use as pre-plant incorporated treatments in barley. For fall application of granular formulations, work the chemical into the soil between September 1 and freeze-up. Use a discer or field cultivator (vibrating shank-type). Disc implements are preferred on stubble. Set equipment to cut at 3 to 4 inches (8 to 10 cm) depth. The initial incorporation should be done within 24 hours of application.

The second incorporation should be done at right angles to the first. The second incorporation may be delayed until spring, except when planting barley, flax or lentils; for these crops both incorporations must be done in fall. Delay the second incorporation 5 days for better weed control. This will allow greater release of the chemical onto soil particles and assure more even distribution. Fall application of granular trifluralin on flax, lentils or barley is not recommended on soils prone to erosion, as the 2 fall incorporations necessary in these crops may leave soils vulnerable to wind or water erosion.

For spring application of liquid and granular formulations, work the chemical into the soil prior to seeding by setting the implement at 3 to 4 inches (8 to 10 cm) cutting depth. The first incorporation must be done within 24 hours of application. The second incorporation must be done at right angles to the first. If incorporating granular trifluralin, delay the second incorporation for 3 days after the first to achieve better weed control.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Injury to flax, barley or lentils may occur if soil and weather conditions are not conducive to rapid crop emergence (cold or dry soils at the time of seeding and crop emergence).

To minimize crop injury, seed into a firm, moist seed bed. Use a press drill or hoe-drill. Sow barley no deeper than 2 inches (5 cm). Sow lentils and flax no deeper than 1.5 inches (4 cm).

Less than acceptable weed control will result if dry conditions prevail at the time of weed emergence.

Rainfall has no direct effect on products' activity. Flooding (3 to 5 days) will cause rapid breakdown of the product resulting in reduced weed control. Flooding for 3 weeks or more will result in total breakdown of the product resulting in loss of weed control.

## Tank Mixes:

**Herbicides:**
***Fababeans:***
Sencor 75 DF (Treflan EC only).
***Peas:***
Sencor (Treflan EC only).
***Dry beans (white and red kidney only):***
Eptam 8-E (Treflan and Rival liquids only).

**Fertilizers:** Liquid product may be applied with liquid fertilizer as a carrier. Before the herbicide is added to the tank, compatibility of the herbicide to liquid fertilizer should be tested following instructions on the herbicide container. Trifluralin liquids may be blended with dry bulk fertilizers (do not mix with nitrate fertilizers). Check label for blending instructions.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Trifluralin labels only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** None. Flooding may reduce weed control.

**Grazing:** Do not graze the treated crops or cut for feed prior to crop maturity.

**Recropping:** Oats, canaryseed, and small-seeded grasses may be affected the year after treatment. Corn is sensitive at higher rates of application. Damage to wheat can occur if the crop is seeded into land that has been treated during the previous 21 months with trifluralin products and has received abnormally low amounts of precipitation. Damage is worse if conditions are not conducive to rapid emergence of the wheat (for example, if the crop is seeded deep or if soil conditions remain cool during emergence). Damage tends to be greater on fields treated with granular formulations.

**Aerial Application:** Do not apply by air.

**Storage:** Granular formulations must be stored in a cool, dry location, out of sunlight.
***Rival EC*** - Do not store below 5°C.
***Treflan EC, Bonanza 400*** - Do not freeze.
***Bonanza 400*** - Do not freeze.

Recommendations for liquid formulations: Crystalization of the active ingredient may occur at less than 5°C. To reconstitute, bring temperature to 15°C and shake well until no crystals are visible. This should be done before adding to the spray tank.

## Tank Cleaning:

Refer to page 14

## Hazard Rating:

Keep out of reach of children.

# Triton C

**Herbicide Group – 2 & 4**
*(Refer to page 27)*

## Company:

E. I. du Pont Canada Inc.

## Formulation:

**Component 1 (Refine Extra - PCP#22352):** 50% thifensulfuron methyl plus 25% tribenuron methyl formulated as a dry flowable.

**Component 2 (Accord – PCP#25118):** 75% quinclorac formulated as a dry flowable

Container size: Component 1 - 320 g and Component 2 - 1.1 kg in a dual chambered jug.

## Crops and Staging:

Spring barley (for feed only), wheat (including durum, and spring) - Apply from 2 to 5 leaf stage.

Do Not use on Leger barley or Belvedere wheat.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

## Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

**Weeds Controlled:**

Annual smartweed (green smartweed, lady's-thumb)
Ball mustard
Chickweed (1 to 6 leaf)
Cleavers (1 to 3 whorls)
Common groundsel
Corn spurry
Cow cockle
Flixweed
Hemp-nettle
Kochia
Lamb's-quarters
Narrow-leaf hawk's-beard
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola (not CLEARFIELD varieties)
Volunteer sunflowers
Wild buckwheat (1 to 3 leaf)
Wild mustard

**Weeds Suppressed:**

Canada thistle, sow-thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Round-leaf mallow (2 to 6 leaf)
Scentless chamomile
Stork's-bill (2 to 6 leaves)
Toadflax (less than 6 inches or 15 cm tall)

## Cost (2005 suggested retail price):

$8.25 per acre.

## Rate:

**Component 1 (Refine Extra):** 8 g per acre
**Component 2 (Accord):** 27 g per acre
One container treats 40 acres.

**Merge adjuvant must be added at 1.0 L per 100 L of spray solution.**

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** Minimum 22 L per acre.

**Pressure:** 30 to 40 psi (210 to 275 kPa ).

**Nozzles:** Flat fan nozzles with 50 mesh line strainers and screens.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Do not apply to wheat, or barley that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result. Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

Kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

## Tank Mixes:

Do not mix with substances that contain boron or that release chlorine.

**Herbicides:**
Puma$^{120}$ Super (0.31 L/acre up to 4 leaf stage only)*.

* Merge adjuvant is NOT required with this mix.

**Fertilizers:** None registered.

**Note: The above mixes are those listed on the Triton label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** Within 4 hours may reduce control in general. Rainfall within 6 hours may reduce control of cleavers.

**Grazing:** Must not be grazed or fed to livestock for 77 days after treating wheat (spring or durum) or 80 days after treating barley.

**Recropping:** Spring wheat (including durum) and spring barley may be reseeded 2 months following Triton application. Wheat, barley, canola, field peas and sunflowers may be grown the year after application. Flax and lentils may be grown the second year after a Triton application. On low organic matter soils or under dry conditions, flax and lentils should not be grown until the third year after application. Do not use Triton on land where potatoes or vegetables are grown. A field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

**Aerial Application:** Do not apply by air.

**Storage:** Store in a cool, dry place. May be frozen.

**Environment:** Leave 15 metres between the downwind edge of the boom and sensitive areas such as shelterbelts, wetlands, sloughs, or wooded areas.

## Tank Cleaning:

Triton can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Triton should be flushed out immediately after Triton is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/ ammonia rinse (1L of 3% ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned after applying this product. Rinse the tank, booms, hoses, and nozzles with clean water to complete the process.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

## Hazard Rating:

CautionPoison (Accord)

Potential Skin Sensitizer (Accord)

Warning Eye and Skin Irritant

# Trophy

**Herbicide Group – 4**
*(Refer to page 27)*

## Company:

Nufarm Agriculture

## Formulation:

The Trophy package has 2 components:

**Trophy A (PCP#27246):** 180 g/L fluroxypyr formulated as an emulsifiable concentrate.

**Trophy B (PCP#27245):** 500 g/L MCPA ester formulated as an emulsifiable concentrate.*

Container size: Trophy A – 4.8L, Trophy B – 9L.

## Crops and Staging:

Spring wheat (including durum), canaryseed* & barley - 3 leaf up to flag leaf fully emerged stage.

**Since the use of this product on canaryseed is registered under the User Requested Minor Use registration system, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this product on canaryseed do so at their own risk.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds controlled at the 2 to 4 leaf stage, unless specified include:**

Burdock
Cleavers (1 to 4 whorls)
Clover (sweet)
Cocklebur
Flixweed
Hemp nettle (2 to 6 leaf)
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Prickly lettuce
Ragweed (common)
Redroot pigweed
Shepherd's-purse
Stinkweed
Sunflower (annual)
Vetch
Volunteer canola
Volunteer flax
Wild radish
Wild mustard

**Weeds suppressed include:**

Smartweed (green)
Stork's-bill
Wild buckwheat (1-4 leaf)

## Cost (2005 suggested retail price):

$10.25 per acre.

## Rate:

**Trophy A:** 0.24 L per acre

**Trophy B:** 0.45 L per acre.

One case of Trophy treats 20 acres. Make only one application per year.

## Application Information:

**Water Volume:** Minimum 40 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Trophy activity is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

## Tank Mixes:

**Herbicides:**

***In spring wheat (including durum) and barley:***

Achieve Liquid (0.2 L/acre) plus Turbocharge adjuvant.

***In spring wheat ( including durum):***

Assert (0.53 to 0.65 L/acre) plus pH adjuster.
Horizon (95 mL/acre) plus Score adjuvant.*
Puma$^{120}$ Super (0.31 L/acre)

**Insecticides:** None registered.

**Fertilizers:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Trophy label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

## Restrictions:

**Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

**Grazing:** Do not graze, harvest forage or cut hay within 7 days of application.

**Preharvest:** Leave at least 60 days from application to harvest.

**Recropping:** Wheat, barley, oats, rye, forage grasses, flax, canola, mustard, lentils and peas may be grown the year after a Trophy application. There are no recropping restrictions the second year after application.

**Aerial Application:** Do not apply by air.

**Storage:** May be frozen. If frozen, bring to room temperatures and agitate before use.

**Environment:** Leave a 15 meter buffer zone between last spray swath and sensitive wild life habitats such as shelterbelts, ponds, wetlands, streams and woodlots.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

DangerPoison.

Warning Eye Irritant.

Caution Skin Irritant.

# Ultim

**(For use only in Manitoba)**

### Herbicide Group – 2

*(Refer to page 27)*

## Company:

E. I. duPont Canada (PCP#24736)

## Formulation:

37.5% rimsulfuron and 37.5% nicosulfuron formulated as a water dispersible granule. Container size – 134.8 g (4 x 33.7 g water soluble bags).

## Crops and Staging*:

The following field corn hybrids at the 1 to 4 leaf stage:

Pioneer Brands 39K72, 39K73, 39W54, 39M27. For use in Manitoba only.

**NOTE - Since applications to corn in Manitoba has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to corn is at the risk of the user.***

## Weeds and Staging:

No information is provided on the label for leaf staging. The manufacturer recommends the following staging:

Wild oats – 3 to 6 leaf stage

Green foxtail, yellow foxtail, barnyard grass, volunteer cereals – 1 to 6 leaf stage (up to 2 tillers)

Quackgrass – 3 to 6 leaf stage (with extended leaf 4 to 8 inches long)

Redroot pigweed – 2 to 6 leaf stage

Contact the manufacturer for additional weeds not listed on the label.

## Cost (2005 suggested retail price):

$23.71 per acre

## Rates:

Apply Ultim 75 DF at 13.5 g/acre.

One water soluble bag of Ultim will treat 2.5 acres (10 acres per container).

Add a non-ionic surfactant (AgSurf, Agral 90, Citowett Plus) at 0.2 L per 100 L of spray solution. Apply Ultim within 24 hours of mixing, as product degradation may occur resulting in reduced weed control. Refer to the product label for complete mixing instructions.

## Application Information:

**Water Volume:** Minimum 40 L per acre; for best results apply 56 to 77 L per acre.

**Nozzles and Screens:** Flat fan nozzles with 50 mesh or larger screens.

## Effects of Growing Conditions:

Rapid fluctuations in temperature (greater than 20°C difference within 24 to 36 hours) will stress the corn crop. For maximum crop safety, allow 48 to 72 hours for the corn to acclimatize before applying Ultim.

Apply ONLY when the temperature in the 24 hours before AND after application is between 5°C and 28°C. Temperatures beyond this range increase the potential for crop injury. Separate applications of Ultim herbicide followed by a broadleaf herbicide (minimum 12 hours later) will reduce the potential for injury.

**WARNING:** Crop injury may result if application is made to corn that has been stressed by abnormally hot, humid or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If corn has been injured by frost, wait 48 to 72 hours before applying Ultim.

## Tank Mixes:

**Herbicides:** None registered.

**Insecticides:** None registered. Ultim should NOT be applied to corn that has been treated with Counter, Cygard, Thimet, Lorsban, or Di-Syston. Leave 7 days between the application of Ultim and that of a foliar organophosphate insecticide.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Ultim label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

## Restrictions:

**Rainfall:** Within 2 to 4 hours of application may reduce weed control.

**Grazing:** Do not graze treated crops or cut for hay.

**Preharvest:** Leave at least 30 days from application to harvest.

**Recropping:** Field corn, winter wheat and spring barley may be planted the year following Ultim application. Perform a field bioassay before planting any other crops, or where Ultim is more persistent (sandy soils, with low organic matter and pH greater than 7).

**Aerial Application:** Do not apply by air.

**Storage:** Store product in original containers in a secure, dry area, away from other pesticides, food, or feed.

**Environment:** Leave a 5 m buffer between the last spray path and woodlots or shelterbelts. Leave a 10 m buffer before wetland areas or water bodies.

## Tank Cleaning:

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill spray tank with a water-ammonia cleaning solution (1 litre of minimum 3% household ammonia for every 100 L of water). Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes, then flush hoses, boom and nozzles with the cleaning solution, and drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a cleaning solution as above. Repeat the above process and then thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer for the next application, flush the tank, boom and hoses for 5 minutes with fresh water. Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

For additional information, refer to page 14.

## Hazard Rating:

Warning – Eye Irritant

Caution – Skin Irritant

# Unity

**Herbicide Group – 2,6**
*(Refer to page 27)*

**(For use only in Saskatchewan)**

## Company:

Bayer CropScience

## Formulation:

The Unity package contains two components:

**Unity 280 EC (PCP#24497):** 280 g/L bromoxynil formulated as an emulsifiable concentrate.

**Unity 75 WG (PCP#24596):** 75% triasulfuron formulated as a dispersible granule.

Container size - one case of Unity contains 2 x 4 L jugs of Unity 280 EC and 4 x 43 g water soluble bags of Unity 75 WG.

## Crops and Staging:

Spring wheat (including durum), and barley - 2 leaf to just prior to flag leaf emergence. For use in the brown and dark brown soil zones of Saskatchewan only.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds controlled at the 2 to 4 leaf stage:**

Chickweed
Cleavers
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Redroot pigweed
Shepherd's-purse
Stinkweed
Wild buckwheat
Wild mustard
Volunteer canola

**Caution:**

Several crops are sensitive to low concentrations of Unity 75 WG in the soil. Therefore, careful consideration should be given to crop rotation plans prior to use. The Unity tank mix is registered for use in Saskatchewan in the brown and dark brown soil zones only. The degradation of Unity 75 WG in the soil is affected by rainfall, soil temperature and soil pH. If you are considering using this product, be sure to read the recropping restrictions outlined in the product label.

## Cost (2005 suggested retail price):

$7.25 per acre.

## Rates:

**Unity 75 WG:** 4.3 g per acre

**Unity EC:** 0.2 L per acre

One case treats 40 acres. Add a recommended non-ionic surfactant such as Citowett Plus, Agral 90, Agsurf, Super Spreader or Companion at 0.25 L per 100 L spray solution.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

## Application Information:

**Water Volume:** 40 L per acre.

**Pressure:** 40 psi (275 kPa).

**Nozzles:** Flat fan. 50 mesh screens or coarser.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Adequate control may not be achieved under unfavourable conditions such as drought, flooding or prolonged temperature extremes.

## Tank Mixes:

**Herbicides:**

***In Spring wheat (NOT including durum) and Barley:***
2,4-D ester (0.34 l/acre – 500 g ai/L formulation)
Lontrel (0.11 L/acre)
MCPA ester (0.34 L/acre)

***In Spring wheat (NOT including durum):***
Puma[120] Super (0.4 L/acre)

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note: The above mixes are those listed on the Unity label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions.

## Restrictions:

**Rainfall:** Do not apply if rainfall is expected within 2 hours.

**Grazing:** Do not graze treated crops or cut for hay until 30 days after application.

**Recropping:** Some crops have shown a high sensitivity to low residues of Unity 75 WG in the soil. The risk of injury to rotational crops is affected by a number of factors including soil factors (soil type and soil pH), environmental factors (soil temperature, precipitation), crop species, and recropping interval. Breakdown of Unity 75 WG in soil is more rapid in high moisture, high temperature, and low pH soils.

To avoid injury to subsequent crops after an application of recommended rates of the Unity tank mix, the following recropping intervals outlined in the following table should be observed:

**Recropping Restrictions:**

| | MINIMAL INTERVAL (MONTHS) | | |
|---|---|---|---|
| **CROP** | **Soil pH 6.4 or less** | **Soil pH 6.5 to 7.4** | **Soil pH 7.5 or greater** |
| Spring wheat (hard red, Canada prairie, extra strong) | No Restrictions | No Restrictions | No Restrictions |
| Barley, oats, durum wheat | 10 | 10 | 10 |
| Flax | 10 | 10 | 22 |
| Peas | 10 | 22 | 22 |
| Canola | 10 | 22 | 34 |
| Canaryseed | 22 | 22 | 22 |
| Mustard | 22 | 22 | 34 |
| Lentils, sunflowers, all other crops | Bioassay | Bioassay | Bioassay |

A field bioassay involves growing test strips of the crop(s) intended for production the following year in fields previously treated with the Unity tank mix. Crop response will dictate whether or not to rotate to the crop(s) used in the test strip. See Bioassay Guidelines section of product label. Apply the Unity tank mix only once per year to the same field.

## Restrictions continued:

**Aerial application:** Do not apply by air.

**Storage:** Do not freeze.

**Environment:** Leave at least a 15 m buffer zone around wildlife habitat. Do not apply to irrigated land.

## Tank Cleaning:

Unity can cause injury to sensitive crops at low concentrations. Clean sprayer immediately after use. Do not clean near desirable vegetation, wells or other water sources. Drain and flush tank and boom with water and household detergent. Add 1 L of 3% household ammonia for every 100 L of water to spray tank and agitate for 15 min. before flushing through nozzles. Wash nozzles and screens in the water/ammonia mix in pail. Rinse system with clean water for 5 minutes.

For additional information, refer to page 14.

## Hazard Rating:

◈ Warning Poison

# Velpar DF

**Herbicide Group – 5**
*(Refer to page 27)*

## Company:

E. I. duPont Canada (PCP#25225)

## Formulation:

75% hexazinone formulated as a water dispersible granule
Container size: 2 kg.

## Crops and Staging:

Established alfalfa for seed. Apply in late fall prior to freeze-up when alfalfa is dormant or in early spring before alfalfa growth resumes. Apply only on alfalfa that has been established for 18 months or longer. If burning or irrigation is to be carried out, do not apply until these operations have been completed. Do not apply to frozen ground.

## Weeds and Staging:

Application stage is dictated by the crop above

Dandelion
Narrow-leaved hawk's beard
Sow-thistle
Quackgrass
Scentless chamomile

## Cost (2005 suggested retail price):

$23.20 to $47.25 per acre.

## Rates:

0.272 to 0.544 kg/acre. Use the lower rate on medium-textured soils with low organic matter. Do not apply to soils with less than 1% organic matter.

## Application Information:

**Water Volume:** 81 L per acre.

**Pressure:** 30 to 40 psi (200 to 275 kPa).

**Nozzles:** Flat fan.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Adequate soil moisture is required for activation of the product.

## Tank Mixes:

None registered.

## Restrictions:

**Rainfall:** Rainfall is beneficial for activation of the product.

**Grazing:** Do not graze the treated crop or cut for feed.

**Recropping:** Insufficient information is available. Velpar residues will persist for 2 or more years after application.

**Aerial Application:** Do not apply by air.

**Storage:** May be frozen.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Danger Corrosive

Caution Poison

Caution Skin Irritant

# Venture L

**Herbicide Group – 1**
*(Refer to page 27)*

## Company:

Syngenta (PCP#21209)

## Formulation:

125g/L fluazifop-p-butyl formulated as an emulsifiable concentrate. Container size 2 x 8 L.

## Crops and Staging:

Preharvest intervals must be followed to avoid unacceptable residues of fluazifop-p-butyl in harvested crops.

| Crop | Crop Stage | Harvest Interval |
|---|---|---|
| Alfalfa | No restrictions | 41 |
| Bird's-foot trefoil and red clover | No restrictions | Do not graze or feed in year of treatment |
| Canola | Do not apply past 5th leaf | 80 |
| Creeping red fescue | 2-5 leaf | For seed only |
| Flax, Solin | No restrictions | 80 |
| Lentil | Do not apply past 6th node | 70 |
| Lupins | No restrictions | 80 |
| Mustard | Do not apply past 5th leaf | 75 |
| Peas | No restrictions | 66 |
| Potatoes | No restrictions | 90 |
| Soybeans | Up to 3rd trifoliate leaf | 90 |
| Sunflowers | No restrictions | 120 |

**When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.**

## Cost (2005 suggested retail price):

$26.40 per L.

## Application Information:

**Water Volume:** 20 to 81 L per acre.

**Pressure:** 30 to 60 psi (200 to 400 kPa).

**Nozzles:** 80° or 110° flat fan nozzles.

## How it Works:

Refer to Table 2 on page 29.

## Effects of Growing Conditions:

Less than acceptable weed control may be expected if weeds are under stress because of excessive moisture, drought, or cool weather.

## Weeds, Rates and Staging:

| Weed | Weed Stage | Rate (L/acre) | Acres per 8 L |
|---|---|---|---|
| Volunteer corn | 2 to 5 leaf stage | 0.24 | 33 |
| Volunteer wheat and barley, Persian darnel, barnyard grass | 2 to 5 leaf stage | 0.32 | 25 |
| Wild oats | 2 to 5 leaf stage | 0.40 | 20 |
| Quackgrass suppression in canola and soybeans | 3 to 5 leaf stage | 0.40 | 20 |
| Green and yellow foxtail | 2 to 4 leaf stage | 0.57 | 14 |
| Quackgrass suppression (all crops) | 3 to 5 leaf stage | 0.80 | 10 |

Apply to annual grasses before tillering for best control.

## Tank Mixes:

**Herbicides:**

***In canola:***
Muster (Argentine varieties only)
Lontrel

***In alfalfa, bird's-foot trefoil & red clover:***
2,4-DB

***In creeping red fescue:***
Ally

***In soybean:***
Basagran + Assist

***In potato:***
Sencor (reduced grass control from Venture L may result)

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

When applying other broadleaf herbicides in the same field, apply the product no sooner than 3 days after application of Venture.

**Note: The above mixes are those listed on the Venture L label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

Adding ingredients in the correct order is critical for optimum performance. Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

## Restrictions:

**Rainfall:** Activity is not affected by rainfall if it occurs at least 2 hours after application.

**Grazing:** Do not graze crops or cut for hay in the year of treatment.

**Preharvest Interval:** See crop stage section.

**Recropping:** Seed only broadleaf crops listed on this label if seeding must occur within 60 days of application.

**Aerial Application:** Do not apply by air.

**Storage:** Product is not affected by temperatures below 0°C.

**Environment:** Do not apply within 15 m of fish-bearing waters and wildlife habitats.

## Tank Cleaning:

Refer to page 14.

## Hazard Rating:

Caution Poison

Skin Irritant

Experimental studies have shown that the active ingredients in this product may cause birth defects in laboratory animals.

Women capable of bearing children should avoid contact with this product.

## Special Weed Problems

This section identifies specific weeds and some herbicides recommended for control. Refer to the particular crop section or the product label for information on specific products that may be used on the crops and for application instructions.

### Absinthe

**2,4-D LV Ester (500 g/L)** - In grass pastures with no legumes, spray 1.82 L/acre in late June, prior to flowering. Re-treat regrowth in late summer when plants have 6 to 10 inches (15 to 25 cm) of new growth. More than 1 season of treatment may be required.

**Banvel II** - In grass pasture and rangeland only, apply 0.5 L/acre in 20 to 30 gallons (90 to 135 L) per acre for top-growth control when leaves are fully expanded.

### Alders

**2,4-D LV Ester (500 g/L)** - In grass pastures and non-crop land, apply 1.78 L/acre to the foliage of actively growing brush.

**Banvel II + 2,4-D amine or LV ester (500 g/L)** - In grass pastures, rangeland and non-crop land, apply Banvel II at 2.1 L per 1,000 L of water with 2,4-D LV ester or amine at 4.0 L per 1,000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

### Aspen Poplar (Trembling Aspen)

**Banvel II + 2,4-D amine or LV ester (500 g/L)** - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.32 L/acre with 2,4-D LV ester or amine at 1.78 L/acre in 20 gallons/acre (90 L/acre) water to the foliage of actively growing brush in spring or early summer.

**Remedy EC** - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

### Baby's Breath (Perennial)

**Banvel II** - In grass pastures with no legumes, apply 3.72 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water when actively growing.

### Biennial Wormwood

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing plants.

### Black Medic

**Bromoxynil+MCPA ester, /Dichlorprop+2,4-D,/Mecoprop, /dicamba+mecoprop+MCPA, /2,4-D amine or LV ester** - Apply in registered crops at registered rates to black medic in the 1 to 4 leaf stage for suppression only.

### Chokecherry

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

**Remedy EC** - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details. May need the higher rates for control and retreatment the following year.

### Common Tansy

**Glyphosate** - Apply at 1.9-2.8 L/acre in 10 gallons of water/acre (40 L/acre) to actively growing plants that are 8-10 inches (20-25 cm) tall (summerfallow, stubble and noncropland).

**Escort** - In pastures, rangeland and rough turf, apply 8 g/acre in 10 to 20 gallons/acre (45 to 90 L/ acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

### Curled Dock

**Banvel II** - As a patch treatment or in pasture and rangeland, apply 0.92 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

**Glyphosate** - As a spot treatment, apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

**MCPA amine, 2,4-D amine** - Apply 0.445 to 0.69 L/acre of formulations containing 500 g/L MCPA or 2,4-D amine to give top growth control.

**Dichlorprop + 2,4-D** - 0.71 L/acre for suppression before plants are 2 inches (5 cm) tall.

**Remedy EC** - In grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

## Diffuse Knapweed

**Banvel II** - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds.

**Tordon 22K** - In rangeland and grass pasture, apply 0.91 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Downy Brome and Japanese Brome

**Glyphosate** - Prior to crop emergence, apply 0.51 to 0.77 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water before downy brome is 6 inches (15 cm) in height.

**Rustler** - Prior to crop emergence, apply 1.0 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water between emergence and heading of downy brome.

**Trifluralin** - Apply at recommended rates for weed control in broadleaf crops prior to emergence.

## Field Bindweed

**Banvel II** - As a patch treatment or in rangeland, apply 1.0 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply when field bindweed is in the flowering stage and allow 3 weeks after treatment before resuming normal summerfallow tillage.

**Basagran** - In labelled crops, apply 0.71 L/acre followed by 0.71 L/acre 7 to 10 days later. Apply in 20 to 35 gallons/acre (90 to 160 L/acre) water before field bindweed has developed a dark green colour and before it has begun trailing. Use a recommended surfactant (see recommendations under the appropriate crop).

**2,4-DB** - As a spot treatment in labelled crops apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water at the bud stage. Do not disturb plants for at least 10 days following treatment. Heavy rainfall within 2 hours of application may wash chemical off the foliage and a repeat treatment may be required. Rainfall occurring within 6 hours after application may reduce control.

**2,4-D amine** - In grass pastures containing no legumes or as a spot treatment, apply 1.82 L/acre of formulations containing 500 g/L 2,4-D amine at early flowering stage.

**Glyphosate** - As a spot treatment, apply 2.8 to 4.9 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) at the full bloom stage or beyond. Allow 7 or more days after application before tillage.

**Remedy EC** - In grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

**Tordon 22K** - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Field Horsetail

**Amitrol 240** - Apply 5.0 to 6.7 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is young and actively growing.

**MCPA amine, potassium and sodium salt mixtures** - Apply 0.57 L/acre of formulations containing 500 g/L MCPA after the weeds have fully emerged for top growth control. May be used in wheat, oats, barley, flax and rye.

## Foxtail Barley

**Glyphosate** - Prior to crop emergence, apply 1 to 2 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water to foxtail barley at the seedling to heading stage. Late fall applications may provide better control of established plants than spring applications.

**Glyphosate** - In Roundup Ready canola, apply 2 applications, each at 0.5 L/acre, for season long control.

**Gramoxone** - Apply 2.23 L/acre in 98 gallons/acre (445 L/acre) water or 75 mL in 2.2 gallons (10 L) water/1076 square feet (100 sq. m) for top growth control only.

**Kerb 50-W** - Apply 0.364 to 0.445 kg/acre product in 20 gallons/acre (90 L/acre) water between October 1 and freeze-up. Use the lower rate on grey-wooded soils or where perennial bluegrass or fescues are the predominant pasture species. Do not use Kerb for foxtail barley removal in seed grass stands or desired foliage stands of timothy or fescue grass species. At recommended rates, pasture stands of perennial bluegrass and fescue may be reduced by 10 to 15 percent. Where perennial bluegrass and fescues are the dominant pasture species, use the lower rate of Kerb. Spray overlaps may seriously harm desirable pasture grass species. Where the grass stand comprises mostly foxtail barley and reseeding to a desirable grass species is required, delay seeding into the Kerb-treated soil until the end of June. Do not harvest or graze within 60 days of application with Kerb. Avoid using Kerb on soils having more than 6 percent organic matter.

**Rustler** - Prior to crop emergence, apply 1.26 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water to foxtail barley before initiation of the seed head for suppression only.

**Sundance** - Apply at 11 g/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water prior to flowering.

## Goat's-Beard

**2,4-D amine** - Apply 0.91 L/acre of formulations containing 500 g/L in early fall or early spring.

**Dichlorprop + 2,4-D** - Apply 1.62 L/acre in early spring or fall.

**Banvel II** - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

## Gumweed

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 0.89 L/acre to the foliage of actively growing plants.

## Hemp Dogbane

**2,4-D amine or LV ester** - Apply 1.38 to 1.82 L/acre of formulations containing 500 g/L 2,4-D in fall before frost and while plant leaves are green.

**Glyphosate** - Apply 2.83 to 4.86 L/acre when hemp dogbane is in the early bud stage. Apply in 10 gallons/acre (45 L/acre) water. Do not disturb treated plants for at least 7 days after application.

## Hoary Cress

**Amitrol 240** - For non-selective patch treatment in pastures and non-crop land, apply 8.9 to 13.8 L/acre.

**Glyphosate** - As a spot treatment in labelled crops, apply 2.83 to 4.86 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

## Leafy Spurge

**Amitrol 240** - Apply 15.2 to 18.5 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is between the late stages of flowering and early seed development.

**Banvel II** - Apply 0.84 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water for top growth control when the weed is actively growing. Patch treatment or pasture.

**2,4-D amine** - Apply 1.82 L/acre of formulations containing 500 g/L 2,4-D at early flowering stage. Repeat at least once to new growth later in the season. Control of established plants and new seedlings will require continued applications for a period of at least 4 to 5 years.

**Tordon 22K** - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Locoweeds, Lupines, and Milk-vetches

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 to 2.75 L/acre at the full bloom stage.

**Remedy EC** - To control vetches in grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

## Milkweed

**Amitrol 240** - Apply 7.6 to 11.3 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures in the early summer when all the shoots have emerged.

**Glyphosate** - When making preharvest applications, use 1.0 L/acre. For patch treatments, apply 4.86 L/acre in 10 gallons/acre (45 L/acre) water. Apply when most plants have reached the bud to bloom stage. Reduced results may occur on plants treated after full bloom as not all milkweed plants reach the required stage of growth at the same time. Repeat treatments may be required. Do not disturb plants for 10 days following treatment. Do not apply to plants covered with dust.

## Narrow-leaf Hawk's-beard

**2,4-DB** - Apply to forage legume crops at recommended rates at the 2 to 4 leaf stage of narrow-leaf hawk's-beard, after legume growth in the fall has stopped.

**2,4-D LV ester (500 g/L)** - In fall stubble, apply 0.57 to 0.90 L/acre to fall rosettes.

**Express Pack** - In registered crops and summerfallow, apply at registered rates to spring seedlings less than 4 inches (10 cm) across or to fall rosettes.

**Glyphosate** - Prior to crop emergence, apply 0.51 to 0.77 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water. Use the high rate if narrow-leaf hawk's-beard is between 3 and 6 inches (8 to 15 cm) in height.

**Glyphosate** - In Roundup Ready canola, apply 0.5 L/acre at the 0 to 6 leaf stage. Not all products are registered. Check glyphosate pages.

## Pasture Sage

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.2 L/acre to the foliage of actively growing plants.

**Banvel II** - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds.

**Tordon 22K** - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Perennial Smartweed

**Glyphosate** - Apply 2.0 L/acre in 10 gallons/acre water. Apply when vines are a minimum of 8 inches (20 cm) tall, but before flowering.

## Poplar

**Glyphosate** - As a non-selective spot treatment, apply 1.21 to 2.43 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in the summer through early fall when brush is actively growing.

**Remedy EC** - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

**Banvel II + 2,4-D** - In grass pasture and rangeland only, apply Banvel II at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4-D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

## Poverty Weed

**Banvel II** - As a spot treatment or in grass pasture or rangeland apply 1.86 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water when weed is actively growing. Banvel II at 0.61 L/acre will provide only top growth control.

**Tordon 22K** - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Prairie Everlasting, Prairie Sage

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing plants in the early fall, and repeat in the spring.

## Purple Loosestrife

(dryland situations only)

**Glyphosate** - Apply 2.43 L/acre in 30 to 60 gallons/ acre (135 to 270 L/acre) water when purple loosestrife is actively growing and at or beyond the bloom stage. If using hand held equipment, apply a 1 to 2 percent solution until plants are wet. Use a 33 percent product solution if using a wiper applicator. Do not treat plants over open water. If possible, remove and destroy the flower heads before treatment to ensure prevention of seed set. For large monocultures of purple loosestrife, gradually work from the periphery inward over a number of years to allow competing vegetation to invade the treated area. Sprayed areas should be monitored for new seedlings to prevent re-infestation of purple loosestrife.

## Red Bartsia

**2,4-D amine or LV ester** - Apply 0.57 L/acre of formulations containing 500 g/L 2,4-D in 10 gallons/acre (45 L/acre) water. On hayland, treat within 10 days after first cutting. Roadsides and pastures should be sprayed as soon as the red bartsia appears, usually in early July. Repeat treatment if necessary for later germination.

## Roses

**Banvel II + 2,4-D amine or LV ester (500 g/L)** - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.48 L/acre with 2,4-D LV ester or amine at 1.78 L/acre to the foliage of actively growing brush in the spring or early summer.

**Escort** - In pasture and rangeland, apply Escort at 0.012 kg/acre with non - ionic surfactant at 0.2 L per 100 L spray solution in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

**Remedy EC** - In grass pasture and rangeland, apply 1.62 to 3.24 L/acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

## Russian Knapweed

**Tordon 22K** - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

**Banvel II** - In grass pasture and rangeland only, apply 3.72 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

## Saskatoon

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

## Scentless Chamomile

**Ally plus 2,4-D** - Apply 3 g/acre Ally plus 0.34 to 0.45 L/acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons/acre (45 L/acre) water for control of scentless chamomile up to the 4 leaf stage in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Banvel II** - Apply 0.51 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

**Bromoxynil+MCPA ester** - Apply in registered crops at label rates when scentless chamomile is in the 2 to 4 leaf stage.

**Curtail M** - In registered crops, apply 0.81 L/acre in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

**Escort** - In pastures, rangeland and rough turf, apply 8 g/acre in 10 to 20 gallons/acre (45 to 90 L / acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Liberty** - In registered crops, apply 1.1 L/acre to plants up to 4 inches (10 cm) in height.

**Lontrel** - In registered crops, apply 0.23 L/acre in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

**Prevail** - In registered crops, apply at a rate of 20 acres per case in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

**Refine Extra** - Apply 8 g/acre in 10 gallons/acre (45 L/acre) water to actively growing seedlings for suppression. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Tordon 22K** - In rangeland and grass pasture, apply 0.445 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Stinging Nettle

**2,4-D amine** - Apply 0.91 to 1.82 L/acre of formulations containing 500 g/L 2,4-D amine.

## Stork's Bill

**Ally Toss-N-Go** - Apply with 2,4-D or MCPA amine or LV ester in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

**Attain** - Apply at a rate of 40 acres per case to registered crops when stork's-bill is in the 1 to 8 leaf stage.

**Basagran** – In registered crops apply 0.91 L/acre at the 2 to 6 leaf stage.

**Dichlorprop + 2,4-D** - Apply at 0.71 L/acre to registered crops when stork's-bill is in the 2 to 4 leaf stage.

**Glyphosate** - in Roundup Ready canola, apply 0.5 L/acre in the 0 to 6 leaf stage.

**Liberty** - in registered crops apply 1.35 L/acre to plants in 1 to 3 leaf stage.

**Linuron** - Apply with MCPA amine in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

**Odyssey/Absolute** – in registered crops, apply 17 g/acre of the Odyssey component plus adjuvant.

**Prestige** - Apply at the rate of one case per 20 acres to registered crops when stork's-bill is in the 1 to 8 leaf stage.

**Roundup Transorb** - in Roundup Ready canola, apply 0.5 L/acre in the 0 to 6 leaf stage.

**Spectrum** – In registered crops apply at 20 acres per case from the 2 to 4 leaf stage.

## Toadflax (Yellow)

**Ally plus 2,4-D** - Apply 2 to 3 g/acre Ally plus 0.34 to 0.45 L/acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons/acre (45 L/acre) water for toadflax suppression in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Amitrol 240** - Apply 7.6 to 11.3 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is in the advanced rosette to prebud stage.

**Dichlorprop + 2,4-D** - Apply 0.71 L/acre in 10 to 18 gallons/acre (45 to 80 L/acre) water in wheat or barley for toadflax suppression. Apply when majority of toadflax is no taller than 6 inches (15 cm). The use of Dichlorprop + 2,4-D for suppression of toadflax in wheat or barley should be part of a long-term planned approach for toadflax control, which includes spring and fall tillage, fall patch spraying, summerfallow or chemical fallow.

**Glyphosate** - Apply 2.83 to 4.86 L/acre when most plants have reached the early bud stage of growth. Allow 7 more days after application before tillage. A rate of 1.0 L/acre may be used with preharvest applications or when controlling in summerfallow situations.

**Refine Extra** - In registered crops, apply 8 g/acre in 10 gallons/acre (45 L/acre) water for suppression of toadflax. Apply when toadflax is less than 15 cm (6 inches) in height. Add non-ionic surfactant at 0.2 L per 100 L spray solution.

**Tordon 22K** - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Western Snowberry (Buckbrush)

**2,4-D amine or LV ester (500 g/L)** - Apply 1.82 L/acre 2,4-D amine or LV ester in a minimum of 20 gallons/acre (90 L/acre) water in spring or early summer. Retreatment may be necessary the following year.

**Banvel II plus 2,4-D LV ester (500 g/L)** - Apply 1.48 L/acre Banvel II tank mixed with 1.82 L/acre 2,4-D LV Ester in 20 gallons/acre (90 L/acre) water in spring or early summer after the leaves are fully expanded.

**Escort** - Apply 10 g/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water between mid-June and mid-August after the brush has leafed out, but before the leaves turn their fall colours.

## White Cockle

**2,4-DB** - Apply Embutox 625 at 1.1 L/acre or Caliber 400 at 1.7 L/acre or Cobutox 600 at 1.1 L/acre for top growth control to registered crops only.

**Mecoprop** - Apply 2.2 L/acre in 18 gallons water/acre (*80 L/acre) for top growth control of established plants. Will also control seedlings. Apply to registered crops only.

## Wolf Willow (Silverwillow)

**Banvel II + 2,4-D amine or LV ester (500 g/L)** - In grass pastures with no legumes, apply Banvel II at 2.1 L per 1000 L of water with 2,4-D LV ester or amine at 4.0 L per 1000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

## Wild Tomato

**2,4-D or MCPA amine or ester (500 g/L)** - Apply 0.34 to 0.45 L/acre to registered crops up to the 8 leaf stage of wild tomato.

**Bromoxynil+MCPA ester** - Apply 0.40 L/acre to registered crops from the 1 to 6 leaf stage of wild tomato.

## Willow

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

**Banvel II+ 2,4-D** - In grass pasture and rangeland only, apply Banvel II at 1.7 L plus 2,4-D 500 amine at 3.24 L per acre in 20 to 30 gallons (90 to 135 L) of water per acre when leaves are fully expanded.

**Glyphosate** - As a non-selective spot treatment, apply 1.21 to 2.43 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in the summer through early fall when brush is actively growing.

**Remedy EC** - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

# Soil Residual Herbicides

When applied at recommended rates in a crop, most herbicide residues will disappear within a few weeks after application and impose no restriction on cropping options the next year. However, some herbicide residues do not degrade quickly, and can persist in the soil for months or years following application, thereby restricting the crops that can be grown in rotation. Herbicide residues in the soil are deactivated in various ways including:

- Break down by chemical reactions,
- Break down by soil microbes,
- Escape to the atmosphere as a gas (volatilization),
- Break down by light (photodegradation),
- Leaching,
- Binding to soil particles.

Herbicides often disappear from the environment by more than one of these mechanisms. Many herbicides considered to be non-residual are bound temporarily to soil particles while they are broken down gradually by either soil microbes or chemical reactions. The binding action insures that the herbicide is not available to the crop in quantities that will cause damage.

As a general rule, breakdown processes are favoured by warm, moist soil conditions. During the winter, when the ground is frozen, and in the summer when the soil is dry, herbicide degradation is reduced. The residual activity of certain herbicides is also affected by soil organic matter and soil pH. These soil factors are seldom uniform across a field.

Herbicide carryover is aggravated by low levels of organic matter and is more likely to occur on eroded hilltops than in other parts of a field. The risk of herbicide carryover will also be greater in sprayer overlaps which are most common around headlands and slough margins.

Growers should be aware of the residual properties before applying any herbicide if they are to avoid cropping restrictions in following years. Knowledge of the limitations associated with herbicides that leave a soil residue, along with an accurate record of application (i.e. rates, locations) will serve to minimize rotational problems. Each herbicide used in mixes should be considered separately.

Soil tests using chemical extraction cannot always give a good indication of the potential injury risk from herbicide residue because of the influence of organic matter, clay and pH. Because of this, a field bioassay or laboratory bioassay, where plants are grown directly in the treated soil are best for detecting the potential for injury. These tests are not intended to be used to shortcut restrictions on the label, but provide information on rotational crops where none is available.

Injury symptoms from other causes can resemble herbicide carryover injury (i.e. cold weather, flooding, drought, insects, diseases, etc.). Consult with your local agronomist on potential causes before spending money on testing.

Herbicides that leave a soil residue and are of particular concern in Western Canada are found in the following chart.

# Recropping Restrictions for Residual Herbicides:

Figures listed are the number of cropping seasons before each crop can be grown ("1" means that the crop can be grown the year following application). Products that have preseeding restriction (in days) are listed in italics. A blank space means that there are no recommendations given on the product label and a field bioassay is recommended by many product manufacturers to determine if these crops are safe to plant. A field bioassay is a strip of a test crop that covers an area of the fieldthat is representative of fieldthe variation and should include an untreated area. Laboratory soil residue bioassay services are also available from Alberta Research Council – Contact Harold Feddema at (780) 632-8238 or Sandi Checkel at (780) 632-8217 for more information.

| **PRODUCT** | Alfalfa | Barley | Canaryseed | Clearfield canola | Non-Clearfield canola | Fababeans | Field corn | Dry beans | Field peas | Flax | Forage grasses | Lentils | Mustard (yellow) | Oats | Potatoes | Rye | Soybeans | Sunflowers | Wheat (durum) | Wheat (spring) | Wheat (winter) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-D* | 1 | *0d* | 1 | 1 | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 |  | 1 |  | 0d |  |  | 1 | 0d | 0d |
| Absolute* |  | 1 | 1 | 1 |  |  |  |  |  | 2 |  |  |  | 1 |  |  |  |  | 1 | 1 |  |
| Accent |  | 1 |  |  |  |  | 1 |  |  |  |  |  |  | 1 |  |  |  |  | 1 | 1 |  |
| Adrenalin |  | 1 |  | 1 |  |  |  |  | 1 |  |  |  |  | 1 |  |  |  |  | 1 | 1 |  |
| Ally (pH less than 7, Brown and Dark Brown soils) |  | 1 | 4 |  | 2 |  |  |  |  | 2 |  | 3 | 4 | 1 |  |  |  |  | 1 | 1 |  |
| Ally (pH less than 7, other soils) |  | 1 | 4 |  | 1 |  |  |  |  | 1 |  | 3 | 4 | 1 |  |  |  |  | 1 | 1 |  |
| Ally (pH 7 to 7.9, Brown and Dark Brown soils) |  | 1 | 4 |  | 3 |  |  |  |  | 3 |  | 4 | 4 | 2 |  |  |  |  | 1 | 1 |  |
| Ally (pH 7 to 7.9, other soils) |  | 1 | 4 |  | 2 |  |  |  |  | 3 |  | 4 | 4 | 1 |  |  |  |  | 1 | 1 |  |
| Amitrol |  | *1d* | 1 | *1d* | *1d* |  | *10d** | *10d** | *10d** | 1 |  | 1 | 1 | 1 |  |  | *6d* | 1 | *1d* | *1d* | *1d* |
| Assert (Black and Grey Wooded soils) |  | 1 | 2 | 1 | 1 |  |  |  | 1 | 1 |  |  |  | 2 |  |  |  | 1 | 1 | 1 |  |
| Assert (Brown and Dark Brown soils) |  | 1 | 2 | 1 | 2 |  |  |  | 2 | 2 |  |  |  | 2 |  |  |  | 1 | 1 | 1 |  |
| Atrazine, Laddock*, Primextra II Magnûm, Shotgun |  |  |  |  |  | 1* | 1 |  | 1* | 1* |  |  |  |  |  |  |  |  |  |  |  |
| Attain, Trophy | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 |
| Avadex | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |  | 1 | 0 | 2 |  | 1 | 1 | 1 | 0 | 0 | 0 |
| Banvel II* |  | 1 |  | 1* | 1* |  | 1 | 1* |  |  |  |  |  | 1 |  |  | 1 |  | 0* | 0* | 1 |
| Curtail M, Eclipse, Prevail, FlaxMax, Prestige | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 1* | 1 | 1 | 2 | 1 | 1 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| Edge | 0 |  | 2 | 0 | 0 | 0 |  | 0 | 0 |  | 2 | 0 | 0 | 2 |  |  | 0 | 0 | 1* | 1* |  |
| Everest, K2 (Brown soils) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 |  |
| Everest, K2 (Dark Brown soils) |  | 1* |  | 1* | 1* |  |  |  | 1* | 1* |  |  |  |  |  |  |  |  | 1 | 1 |  |
| Everest, K2 (Black soils) |  | 1* |  | 1* | 1* |  |  | 1* | 1* | 1* |  |  |  |  |  |  |  |  | 1 | 1 |  |
| Everest, K2 (Grey-Wooded soils) |  | 1* |  | 1* | 1* |  |  |  | 1* |  |  |  |  |  |  |  |  |  | 1 | 1 |  |
| Frontier |  |  |  |  |  |  | 0* | 0* |  |  |  |  |  |  |  |  |  |  |  |  | 1 |
| Frontline, Spectrum (F=Frontline only) |  | 1 |  | 1 | 1 |  |  |  | 1(F) |  |  |  |  |  |  |  |  |  | 1 | 1 | 1 |
| Kerb | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| Lontrel |  | 1 |  | 1 | 1 |  |  |  |  | 1 | 1 |  | 1 | 1 |  | 1 |  |  | 1 | 1 |  |
| Muster, Muster Gold | 2 | 1 | 2 |  | 2 | 2 |  |  | 2 | 1 | 2* | 2 | 2 | 1 |  |  |  |  | 1 | 1 | 1 |
| Odyssey* | 1 | 1 | 1 | 1 |  |  |  |  | 1 | 2 |  | 1 |  | 1 |  |  |  |  | 1 | 1 |  |
| PrePass |  | 0d |  | 1 | 1 |  |  |  | 1 | 1 |  | 1 | 1 | 0d |  |  |  |  | 0d | 0d | 0d |
| Prism |  | 1 |  |  |  | 1* | 1 |  |  |  |  |  |  |  | 1 |  | 1 |  |  |  | 0 |
| Pursuit, Pursuit Ultra | 1 | 1 |  | 0 |  |  |  |  | 0 |  |  | 1 |  |  |  |  |  |  | 2 | 1 |  |
| Reflex* |  |  |  |  |  |  | 1 | 0 |  |  |  |  |  |  |  |  | 0 |  |  | 1 | 0 |
| Sencor |  |  |  | 2 | 2 | 0 |  |  | 0 |  |  |  |  |  | 0* |  | 0* | 2 |  |  |  |
| Sundance - organic matter less than 4% |  | 2 |  | 1 | 2 |  |  |  | 2 | 2 |  |  |  |  |  |  |  |  | 1 | 0 |  |
| Sundance - organic matter less than 4% under drought** |  | 3 |  | 1 | 3 |  |  |  | 3 | 3 |  |  |  |  |  |  |  |  | 1 | 0 |  |
| Sundance - organic matter greater than 4% |  | 1 |  | 1 | 1 |  |  |  | 1 | 1 |  |  |  |  |  |  |  |  | 1 | 0 |  |
| Sundance - organic matter greater than 4% under drought** |  | 2 |  | 1 | 2 |  |  |  | 2 | 2 |  |  |  |  |  |  |  |  | 1 | 0 |  |
| Trifluralin | 0 | 1* | 2 | 0 | 0 | 0 | 1* | 0 | 0 | 1* | 2 | 0 | 0 | 2 |  | 0 | 0 | 0 | 1* | 0* | 1* |
| Ultim |  | 1 |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |
| Unity - soil pH less than 6.5* |  | 1 | 2 |  | 1 |  |  |  | 1 | 1 |  |  | 2 | 1 |  |  |  |  | 1 | 0 |  |
| Unity - soil pH 6.5 to 7.4* |  | 1 | 2 |  | 2 |  |  |  | 2 | 1 |  |  | 2 | 1 |  |  |  |  | 1 | 0 |  |
| Unity - soil pH greater than 7.4* |  | 1 | 2 |  | 2 |  |  |  | 2 | 2 |  |  | 3 | 1 |  |  |  |  | 1 | 0 |  |

* The minimum recropping intervals are listed. These intervals may be longer than those listed depending on the use rates, region, soil types, environment, time of application and crop varietiy. Refer to product page for more information.

** Drought restrictions apply to drought conditions (80% of normal June to September rainfall) for high pH soils (greater than pH 7.5) and severe drought (less than 65% of normal June to Sept. rainfall) for all soils.

0 - May be seeded or reseeded the year of application. No recropping restrictions. 1 - Next cropping season after application. 2 - Two cropping seasons after application.
NR - Not recommended. **Note: The recropping intervals listed may not be sufficient to prevent crop injury during periods of below average rainfall.**

# Effect of Rainfall on Herbicide Efficacy

| Required Interval | Product |
|---|---|
| 15 minutes | Reglone |
| 30 minutes | Horizon |
| 1 hour | Achieve Liquid, Achieve Liquid Gold, Assure II, Bromoxynil, Bromoxynil+MCPA ester, Clethodim, Elite, Everest, Gramoxone, Horizon BTM, Poast Ultra, Puma$^{120}$ Super |
| 2 hours | 2,4-D LV Ester, Ally+2,4-D LV Ester, Atrazine (post-emergent applications), Fusion, MCPA Ester, Unity, Venture L |
| 3 hours | Odyssey, Odyssey DLX, dicamba+mecoprop+MCPA |
| 4 hours | Accent, Ally + 2,4-D Amine, 2,4-D Amine, Harmony Total, K2, Liberty, Liberty 200 SN, MCPA Amine, Prism, Refine Extra, Refine M, Reflex, Triton C, Ultim |
| 6 hours | Assert, Avenge, Curtail M, Everest, Express Pack, Express TNG, FlaxMax, K2, MCPA-K, MCPA Sodium Salt, Muster, Muster Gold, Option 35DF, Prestige, Prevail Liquid, Rustler, Sencor, Shotgun, Tordon 22K |
| 8 hours | Basagran, Laddock |
| No specific recommendation* | 2,4-DB, Absolute, Adrenalin, Amitrol 240, Attain, Bromoxynil + 2,4-D ester, dicamba, dicamba+mecoprop+MCPA, Dichlorprop + 2,4-D, DyVel, DyVel DSp, Escort, Frontline, Frontline+2,4-D, Glyphosate, Grazon, Linuron, Lontrel, MCPB + MCPA, Mecoprop, Pinnacle, PrePass, Pursuit, Pursuit Ultra, Remedy, Solo, Spectrum, Sundance, Trophy, Unity |

* The products listed make no specific time recommendation on the label. The required rainfree period could be up to 8 hours. See the product page in the guide or consult the product label.

**Note:** The term "Rainfastness" refers to the time needed between application and rainfall to avoid significant reduction in efficacy. Rainfall shortly after application of most post-emergent herbicides may reduce weed control. Effect will vary with product, the interval between spraying and rainfall and the intensity and duration of the rainfall. These guidelines are based on label information. Use the longest time interval on the component products when considering tank mixes.

# Plant Disease Control

## Integrated Plant Disease Management

### Cereals

### Cereal Leaf Diseases

Cereal leaf diseases continue to hurt growers on two fronts: yield and quality. The following management practices are recommended for effective control of leaf diseases in all cereal crops, especially high-value barley.

**Scouting:** Scout fields prior to, during, and following flag leaf emergence to check for disease levels. Healthy flag and upper leaves are critical, since more than 50% of grain filling is contributed by upper leaves.

**Crop Rotation:** Rotate crops (e.g. wheat/oilseed/barley/pulse) to reduce the build-up of disease inoculum in crop residue. If at all possible, do not follow wheat with wheat or barley with barley. When a short rotation is absolutely necessary, seed in the second year a variety that is more resistant to an anticipated disease problem.

**Clean Seed:** Use certified seed and/or seed that has been tested at an accredited laboratory and is known to have low or no seed-borne disease. Treating with an appropriate fungicide will reduce the possibility of introducing seedborne inoculum into a field.

**Seed Treatments:** Seed treatments together with quality seed help emerging crops by controlling most seed-borne disease and allowing the crop to get a good start (quicker, more uniform plant emergence and better seedling vigour). Seed treatments protect young plants against seedling diseases but do not prevent later infection by cereal leaf diseases.

**Resistant Varieties:** Provincial crop/seed guides provide a comprehensive listing of the performance of adapted varieties, including their resistance status to specific diseases.

**Foliar Fungicides:** Foliar fungicides applied at the proper time in accordance with manufacturer's recommendations can control cereal leaf diseases and help to attain target yields. The greatest benefit occurs when disease pressure is high or with varieties that have poor resistance.

**Spraying Practices:** For maximum effectiveness, foliar fungicides should be applied preventively (when infection levels are low). Good spray coverage with minimal drift is essential. Ideally, the best time to spray is when the wind is light; humidity is above 60%; and air temperature is between 10 and 25°C.

### Fusarium Head Blight

Fusarium head blight (FHB) of cereals causes a reduction in yield as a result of floret sterility and the loss of light weight kernels during combining. More important is the effect on grain quality and food safety. In Manitoba, FHB currently occurs throughout all crop regions and will damage wheat crops whenever environmental conditions favour the disease. In Saskatchewan, FHB is established in eastern regions but has occurred in other areas throughout the province.

For FHB to occur, three requirements must be met: the disease causing fungus must be present, a susceptible host grown, and environmental conditions favourable for infection and disease development. If any one of these factors is missing disease cannot occur; the severity of disease in the field is a result of the interaction of the above factors.

#### Field Management to Prevent Recurrence

Weather patterns are by far the greatest factor in the recurrence of FHB. The disease is most likely to develop when the plants are flowering, temperatures range from 15 to 30°C and moisture is continuous for 48 to 60 hours. If conditions remain warm and moist, the pathogen can continue to sporulate and spread to other kernels or heads. Under these optimum conditions, crop management has little impact on FHB outbreaks.

#### Crop Rotation and Selection

A break of at least one year – preferably two years – is advised between cereal, grass and corn production. Regardless of the rotation, producers should consider planting cereals that are less susceptible to FHB. Results from previous years show that durum wheat is more susceptible than hard red spring wheat varieties. Barley is more tolerant than wheat, and oats are more tolerant than either wheat or barley.

Avoid planting the more susceptible types of wheat in high risk areas such as the southern part of the Red River Valley and southeastern Saskatchewan. Planting two or more varieties of wheat with differing flowering times or varying planting dates will help reduce the risk of infection. Susceptible crops should definitely not be planted on infected corn stubble. Corn trash is slower to decompose than cereal trash, and acts as a source of inoculum for a much longer time period. In fields of wheat on wheat stubble, the incidence was about one and a half times higher than in fields of wheat planted into pulse crop residue.

## Potatoes

One of the major threats to Manitoba and Saskatchewan's potato industry is the fungal disease late blight. At present, there are no fungicides registered for use on potatoes that are capable of eradicating the fungus once it is present. As a result, producers are forced to adopt preventive management to control this disease. One of the main components of this strategy is the application of fungicides at specified spray intervals. This interval varies with the type of fungicide used. Shortening or lengthening of this interval should be based on current weather conditions and the status of the disease in the crop.

In Manitoba and Saskatchewan, potato producers can make use of a weather-based late blight forecasting program. The purpose of this program is to predict when environmental conditions are most conducive to disease development and issue warnings based on those predictions.

Accurate weather monitoring and scouting techniques are very important for achieving the most effective use of fungicides. Combining precise weather monitoring with spray interval scheduling may lower input costs for the farmer and lead to a more productive, higher quality crop. These weather monitoring systems monitor key environmental variables, such as relative humidity, temperature, leaf wetness and precipitation.

The following management practices are recommended for effective control of late blight in potato crops.

**Scouting:** To effectively schedule preventative fungicide applications and eliminate unnecessary fungicide use, local weather forecasts should be used to identify conditions conducive to disease development. Scout fields to identify hot spots and other sources of disease when conditions are favourable.

**Crop Varieties and Disease Resistance:** Select varieties with resistance to late blight wherever possible. Where practical, the use of short season varieties may help reduce the period of use for fungicides.

**Healthy Seed:** Obtain seed from sources with effective disease management practices. The use of certified seed is recommended in Manitoba and legislated in Saskatchewan. Grade seed carefully while cutting and discard suspicious looking tubers and seed pieces.

**Sanitation and Cull Clean-up:** Follow a program of sanitation for storage facilities and equipment to eliminate sources of the disease. Avoid leaving tubers, including debris or slivers from seed cutting, in cull piles for any length of time. Dispose of cull piles in an approved manner so they do not serve as a source of late blight inoculum for future infections. Dispose by burying, using a cover, spreading out on the field over winter, or feeding to livestock.

**Cultural Practices and Rotation:** Use proper cultural practices including: rotate potato crops with non-late blight hosts; use proper hilling to reduce infection in tubers; increase spacings of plants to reduce canopy density; manage irrigation use to avoid increasing disease risk during prolonged periods of wetness; identify and destroy hot spots of infected fields; control weed hosts and remove and destroy volunteer potatoes.

## Canola

For the past 25 years, sclerotinia stem rot has been one of the two prominent diseases affecting canola in Manitoba and Saskatchewan. An important factor of disease development is environmental conditions. The disease is much more widespread and severe during wet years.

Fungicide applications are an important element in controlling the development and spread of sclerotinia. Fungicide spray decisions are based on soil moisture, weather conditions, crop stage and density, and the history of disease in your area.

The sclerotinia resting bodies require moist soil conditions for up to 10 days for germination to occur and the sporebearing structures (apothecia) to form. Usually these conditions do not occur until the crop canopy closes. The spores released from the apothecia utilize the canola petals as a food source and fall into the canola canopy where they infect individual plants. Lesions form up and down the stem, wilting leaves and eventually killing the plant. Fungicide should be applied between the 20 to 50% flower stages to protect the petals from being colonized by the spores.

## Pulse Crops

There are a variety of pulse crops produced in Manitoba and Saskatchewan including field pea, field bean, lentil, chickpea and soybean. Pulse crops are adapted to different regions and will require unique agronomic and disease management practices. Some diseases will attack all pulse crops, e.g. sclerotinia (white mould) and seedling/root rots caused by *Pythium, Rhizoctonia, Fusarium, Botrytis* species. Some diseases may occur on more than one type of pulse crop, but the pathogen species infecting each is specific to that crop. This is the case for the ascochyta blights, powdery mildews and anthracnose. It is important to source a variety of information on pulse disease control from grower organizations such as the Saskatchewan Pulse Growers (www.saskpulse.com), provincial specialists, and field diagnostic guides. Most foliar diseases are favoured by warm, moist conditions and lush crop canopies, but root rots and powdery mildew can be present in dry years as well. In general, pulse disease management will need to include the following practices:

**Use of clean seed and seed treatments:** Plant certified seed or seed that has been tested at an accredited lab and known to have zero or acceptable levels of seed-borne disease and high germination. Seed treatments will help protect seed and seedlings from low levels of seedborne and soilborne pathogens.

**Crop Rotation:** It is important to keep at least three years between the same type of pulse crop to allow for the breakdown of crop residue on which disease pathogens survive. Since there are diseases that affect more than one type of pulse crop, it is still important to maintain at least two years even between different pulse crops.

**Crop Varieties with Disease Resistance:** Refer to provincial seed guides for varieties adapted to your region. Choose varieties with disease resistance, when available.

**Scouting and Foliar Fungicide Application:** Begin crop scouting at the vegetative stages for aggressive diseases such as ascochyta blight in chickpea. Scout for other foliar diseases at early bloom, e.g. ascochyta blight and anthracnose in lentil. It is too late to apply fungicide to control sclerotinia (white mould) once symptoms are observed, so forecasting to determine risk is necessary.

There are now a number of foliar fungicides registered for pulse crops. Use foliar fungicides only when disease risk and potential loss are significant. Rotate fungicides from different fungicide groups to prevent the development of resistant pathogen populations.

# Resistance Management

Any fungal pathogen population may contain strains naturally resistant to a fungicide and other fungicides within the same Group. A gradual or total loss of disease control may occur over time if these fungicides are used repeatedly in the same fields. Other resistance mechanisms that are not linked to site of action but specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance management strategies should be followed.

**To delay fungicide resistance:**

- Where possible, rotate the use of a fungicide, and others within the same Group, with different Groups that control the same pathogens.
- Avoid application of more than the maximum number listed in the label. Also avoid consecutive sprays of a fungicide, or other fungicides in the same Group, in a season.
- Fungicide use should be based on an integrated pest management (IPM) program that includes scouting and accurate recording related to pesticide use and crop rotation. An IPM program also considers cultural, biological and other chemical control practices.
- Monitor treated fungal populations for signs of resistance development. If disease continues to progress after treatment with a product, do not increase the use rate. Discontinue use of the product and switch to another fungicide with a different target site of action, if available.
- Contact your local extension specialist or certified crop advisor for any additional pesticide resistance-management and/or IPM recommendations for specific crops and disease problems in your area.

**Table 1: Fungicide Groups Based on Mode of Action**

| Group | Chemical Group/ Mode of Action | Foliar Fungicide Common Name | Seed Treatment Common Name |
|---|---|---|---|
| 1 | MBC/ inhibition of tubulin formation | Senator 70WP | Crown*, DCT*, Mertect SC, Senator-PSPT |
| 2 | Dicarboximides/ affect cell division, DNA/RNA synthesis and metabolism | Ronilan EG, Rovral Flo | Foundation Lite * |
| 3 | DMI/ inhibition of sterol biosynthesis | Propiconazole-based Fungicides, Folicur, Stratego 250EC* | Baytan 30, Charter, Dividend XL RTA*, Gemini*, Helix*, Helix XTra*, Raxil 250 FL |
| 4 | PA/ affect RNA synthesis | Ridomil Gold/Bravo* | Allegiance FL, Apron FL, Apron Maxx RTA*, Dividend XL RTA*, Helix*, Helix XTra*, Prosper FL* |
| 7 | Carboximides/ affect mitochondrial transport chain | Lance | Crown*, Gaucho CS FL*, Prosper FL*, Vitaflo 280*, Vitavax rs Fungicide*, Vitavax Single Solution |
| 11 | QoI/ inhibition of mitochondrial respiration | Headline EC, Quadris, Reason 500SC, Stratego 250EC*, Tanos 50 DF* | None |
| 12 | PP/ affect proteins involved in membrane permeability | None | Apron Maxx RTA*, Helix*, Helix XTra*, Maxim 480FS, Maxim PSP |
| 15 | Cinnamic acids/ affect cell wall synthesis | Acrobat MZ*, Acrobat 50WP | None |
| 22 | Benzamide/ inhibition of tubulin formation | Gavel 75 DF* | None |
| 28 | Carbamates/ affect cell membrane permeability | Tattoo C* | None |
| 29 | 2,6-Dinitroanilines/ uncouples oxidative phosphorylation | Allegro 500F | None |
| M | Multi-site activity | Acrobat MZ*, Bravo 500, Copper-based Fungicides, Gavel 75 DF*, Kumulus DF, Mancozeb-based Fungicides, Polyram DF, Ridomil Gold/ Bravo*, Tattoo C* | Agrox B-2, Agrox CD, Captan Flowable, DB-Red L, DCT*, Foundation Lite*, Gaucho CS FL*, Gemini*, Mancozeb-based Fungicides, Polyram 16D, Prosper FL*, Raxil T, Thiram 75WP, Vitaflo 280*, Vitavax rs Fungicide* |
| U | Cyanoacetamideoximes/ unknown | Curzate 60 DF, Tanos 50 DF* | None |

* Products contain more than one active ingredient and appear in more than one group.

MBC = Methyl Benzimidazole Carbamates
DMI = Demethylation Inhibitors (SBI Class I)
PA = Phenyl Amides
QoI = Quinone outside Inhibitors
PP = Phenyl Pyrroles
SBI = Sterol Biosynthesis Inhibitors

# Foliar Fungicide Tables

**Table 2. Foliar Fungicides for Disease Control in Potatoes**

| FUNGICIDES | Page | Botrytis Gray Mould | Early Blight, Late Blight |
|---|---|---|---|
| Acrobat WP† | 233 | | ② |
| Acrobat MZ | 233 | | • |
| Allegro 500F | 234 | | ② |
| Bravo 500 | 235 | • | • |
| Copper 53W | 236 | | • |
| Copper Spray | 236 | | • |
| Curzate 60 DF† | 238 | | ② |
| Dithane DG Rainshield NT | 246 | | • |
| Gavel 75 DF | 239 | | • |
| Headline EC | 240 | | • |
| Kocide 101 | 236 | | • |
| Kocide 2000 | 236 | | • |
| Kocide DF | 236 | | • |
| Lance | 244 | | ① |
| Manzate DF | 246 | | • |
| Parasol Flowable | 236 | | • |
| Parasol WP | 236 | | • |
| Penncozeb 75 DF | 246 | | • |
| Polyram DF | 247 | | • |
| Quadris | 250 | | • |
| Reason 500SC | 251 | | • |
| Ridomil Gold/Bravo | 252 | • | • |
| Tanos 50 DF | 257 | | • |
| Tattoo C | 258 | | ② |

† must not be used alone, only as a tank mix (consult individual label)
① early blight only
② late blight only
**Note:** Before using any pesticide on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

**Table 3. Foliar Fungicides for Disease Control in Cereals**

| FUNGICIDES | Page | Wheat | Barley | Oats | Rye | Corn | Common Rust (Corn) | Crown Rust (Oats) | Leaf Rust | Stem Rust | Stripe Rust | Septoria (Wheat, Barley, Oats,) | Tan Spot (Wheat) | Net Blotch, Scald (Barley) | Powdery Mildew | Spot Blotch | Gray Leaf Spot (Corn) | Fusarium Head Blight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bravo 500 | 235 | X | | | | | | | | | | ① | • | | | | | ④ |
| Bumper 418EC | 248 | X | X | X | | | | • | ② | ② | ① | • | • | • | ② | | | |
| Dithane DG Rainshield NT | 246 | X | | | | | | | ① | | | ① | • | | | | | |
| Headline EC | 240 | X | X | | X | X | • | | ③ | | ② | ① | • | • | ③ | ② | • | |
| Manzate DF | 246 | X | | | | | | | ① | | | ① | • | | | | | |
| Penncozeb 75 DF | 246 | X | | | | | | | ① | | | ① | • | | | | | |
| Stratego 250EC | 256 | X | | | | | | | ① | ① | ① | ① | • | | ① | | | |
| Tilt 250E | 248 | X | X | X | | | | • | ② | ② | ① | • | • | • | ② | | | |

① wheat only
② wheat and barley
③ wheat and rye
④ suppression only

**Table 4. Foliar Fungicides for Oilseed and Pulse Crops**

| FUNGICIDES | Page | Canola | Beans | Chickpeas | Lentils | Peas | Soybeans | Alternaria Blackspot (Canola) | Anthracnose (Beans, Lentils) | Ascochyta Blight (Chickpeas, Lentils, Peas) | Bacterial Blight (Beans) | Blackleg (Canola) | Botrytis Gray Mould (Beans,Chickpeas, Lentils, Peas) | Downy Mildew, Anthracnose (Beans) | Frogeye Leaf Spot (Soybeans) | Mycosphaerella Blight (Peas) | Powdery Mildew (Peas) | Rust (Beans) | SclerotiniaWhite Mold (Canola, Beans) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bravo 500 | 235 | | | X | X | X | | | ① | • | | | | | | • | | | |
| Bumper 418EC | 248 | X | X | | | | | | | | | • | | | | | | • | |
| Copper 53W | 236 | | X | | | | | | | | • | | | • | | | | | |
| Dithane DG Rainshield NT | 246 | | | | X | | | | ① | ① | | | | | | | | | |
| Headline EC | 240 | | X | X | X | X | X | | • | • | | | | | • | • | • | • | |
| Kocide 101 | 236 | | X | | | | | | | | • | | | | | | | | |
| Kumulus DF | 243 | | | | | X | | | | | | | | | | | • | | |
| Lance | 244 | X | X | X | X | X | | • | | • | | | ④ | | | | | | ⑤ |
| Parasol Flowable | 236 | | X | | | | | | | | • | | | | | | | | |
| Parasol WP | 236 | | X | | | | | | | | • | | | | | | | | |
| Quadris | 250 | X | X | X | X | X | | • | • | • | | • | | | | • | | | • |
| Ronilan EG | 253 | X | X | | | | | | | | | | ② | | | | | | • |
| Rovral Flo | 254 | X | | | | | | • | | | | | | | | | | | ③ |
| Senator 70 WP | 255 | | X | | | | | | | | | | | | | | | | ② |
| Tilt 250E | 248 | X | X | | | | | | | | | • | | | | | | • | |

① lentils only
② beans only
③ canola only
④ except beans
⑤ includes chickpeas & lentils

**Table 5. Foliar Fungicides for Disease Control in Specialty Crops**

| FUNGICIDES | Page | Alfalfa grown for seed | Canaryseed | Bluegrass, Fescues and Ryegrass grown for seed | Common Leaf Spot (Seed Alfalfa) | Leaf and Stem Spot Diseases | Leaf Rust, Stem Rust (Grass Seed) | Powdery Mildew (Grass Seed) | Septoria (Canaryseed) |
|---|---|---|---|---|---|---|---|---|---|
| Bumper 418EC | | | X | | | | | | ① |
| Dithane DG Rainshield NT | 241 | X | | | | • | | | |
| Headline EC | 235 | X | | X | • | | • | ① | |
| Tilt 250E | 252 | | X | | | | | | ① |

① suppression only

# Acrobat MZ/ Acrobat 50 WP

Fungicide Group – 15, M
*(Refer to page 230)*

## Company:

BASF Canada

Acrobat MZ - PCP# 24546

Acrobat 50 WP - PCP# 27700

## Formulation:

Acrobat MZ - 9% dimethomorph and 60%mancozeb formulated as a wettable powder. Container size - 10 kg.

Acrobat 50 WP - 50% dimethomorph formulated as a wettable powder. Container size - 1.82 kg.

## Crops:

Potatoes.

## Diseases Controlled:

**Acrobat MZ** - Early and late blight. Reduction of late blight tuber rot.

**Acrobat 50 WP** - Late blight. Reduction of late blight tuber rot.

## Crop Stage:

Make the first application when the disease threatens or when the first visible signs of disease occur in the field or nearby. Apply every 5 to 7 days under high disease pressure or every 7 to 10 days under low disease pressure. Do not apply more than 3 times per season. It is recommended to apply this product alternately with a fungicide having a different mode of action. Under high level of late blight infection, apply after top kill to control tuber blight.

## How it Works:

**Acrobat MZ** has protectant, systemic and antisporulant activity. The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity. The active ingredient dimethomorph penetrates into the leaf tissue and moves within the leaf.

**Acrobat 50 WP** has protectant, systemic and antisporulant activity. The active ingredient dimethomorph penetrates into the leaf tissue and moves within the leaf.

## Cost (2005 suggested retail price):

**Acrobat MZ** - $32.90/acre.

**Acrobat 50 WP** - $26.59/acre.

## Rate:

**Acrobat MZ** - Apply at 1.0 kg per acre.

**Acrobat 50 WP** - Apply at 182 g per acre. Do not apply Acrobat 50 WP alone. This fungicide must be tank mixed one of the following fungicides: Polyram DF, Dithane DG Rainshield, or Bravo 500, at the recommended product label rate.

## Water Volume:

Use sufficient water to obtain adequate spray coverage.
Ground - 80 L/acre.
Aerial - minimum 20 L/acre.

## Tank Mixes:

**Acrobat MZ** - None registered.

**Acrobat 50 WP** - Must be tank mixed with one of the following fungicides: Polyram DF, Dithane DG Rainshield, or Bravo 500

## Restrictions:

**Rainfall:** Do not apply when rain is expected within 2 - 3 hours. Apply to dry foliage.

**Preharvest Interval:** Acrobat MZ - 14 days. Acrobat 50 WP - 4 days

**Recropping:** Do not replant in treated area within 120 days of last application.

**Environment:** Do not apply to terrain where there is a potential for surface runoff to enter aquatic systems. This product is highly toxic to aquatic organisms. Do not apply within 100 m of streams, ponds, rivers and lakes when applying by air and within 50 m when applying by ground. When using Acrobat 50 WP consult the labels of the tank mix partner and observe the largest buffer zone of the product used in the tank mix.

**Storage:** Store under cool, dry conditions in secure, well ventilated buildings away from food or feed.

**Resistance:** Plant disease fungi can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecast and recommendations.

## Hazard Rating:

Caution: Potential skin sensitizer.

# Allegro 500F

**Fungicide Group – 29**
*(Refer to page 230)*

## Company:

Syngenta – PCP# 27517

## Formulation:

40% fluazinam. Container size – 2 x 10 L.

## Crops:

Potatoes

## Diseases Controlled:

Late blight

## Crop Stage:

Begin applications when the plants are 15-20 cm tall or when conditions favour disease development. Repeat application at 7-10 day intervals. Do not make more than 10 applications in a season.

## How it Works:

Fluazinam is a pyridinamine fungicide with protective (contact) activity.

## Cost (2005 suggested retail price):

$16.00/acre.

## Rate:

0.16 L/acre.

## Water Volume:

80-240 L/acre. Spray volumes vary with amount of plant growth; apply in sufficient water to obtain adequate coverage of foliage.

## Tank Mixes:

None registered.

## Restrictions:

**Application:** Do not apply by air.

**Resistance:** This product is a Group 29 fungicide and is considered to have low risk of resistance development. It is recommended to not rely exclusively on the same product for pest control. Prolong the effectiveness of this product by not making more than 3 consecutive applications before alternating to a fungicide with a different mode of action. Use as part of an integrated pest management program.

**Preharvest interval:** 14 days

**Re-cropping:** Can be replanted with potatoes as soon as practical after the last application, 30 days for other root crops and leafy vegetates, and 70 days for all other crops. Fluazinam will carry over, do not use in areas treated with this product during the previous season.

**Environment:** Do not apply during periods of dead calm or when winds are gusty. Do not contaminate aquatic habitats when cleaning and rinsing spray equipment or containers. Do not overspray non-target terrestrial or aquatic habitats.

## Precautions:

Keep out of reach of children. Causes skin irritation. Harmful if swallowed or absorbed through skin. Avoid contact with eyes. Wear coveralls over long sleeved shirt, long pants, chemical resistant gloves, socks and footwear. Avoid breathing spray mist.

## Hazard Rating:

Caution Poison

Warning - skin irritant.

Potential skin sensitizer.

# Bravo 500

**Fungicide Group – M**
*(Refer to page 230)*

## Company:

Syngenta PCP# 15723

## Formulation:

500 g/L chlorothalonil formulated as a suspension.
Container sizes - 2 x 10 L case, 200 L drum.

## Crops:

Wheat (all wheat including durum & winter wheat), potatoes, lentils, chickpeas and field peas.

## Diseases Controlled:

**Wheat** - Tan Spot, Septoria Glume Blotch, Septoria Leaf Spot. Suppression of Fusarium Head Blight (Scab).

**Potatoes** - Early and late blight, Botrytis vine rot.

**Lentils** - Anthracnose and Ascochyta blight.

**Chickpeas** - Ascochyta blight

**Peas** - Mycosphaerella blight

## Crop Stage:

**Wheat** - For control of Tan Spot and Septoria, begin application at flag leaf emergence and repeat 10 to 14 days later when ears are visible. A third application when ears are fully emerged may be necessary, if conditions favour disease spread. For suppression of Fusarium Head Blight apply Bravo at early flowering. For best results, this application must be made before flowering has started in the majority of tillers and before the beginning of weather favouring disease. Do not make more than 3 applications per season. Rates and number of applications will depend upon disease severity and weather conditions.

**Potatoes** - Begin application when plants are 6 to 8 inches (15 to 20 cm) high or when disease threatens. Repeat applications at 7 to 10-day intervals or as necessary to maintain disease control. Under severe disease conditions use the higher rates at 7-day intervals.

**Lentils** - One application, must occur at early flowering. Two applications - first application before flowering when bud formation is evident. Second application must occur at early to mid-flowering, 10 to 14 days after the first application, but before rows close in to form a dense canopy. Rates and number of applications will depend upon disease and weather conditions.

**Chickpeas** - Make first application at early flowering and remaining applications at 10-day intervals. Do not make more than 3 applications per season. Rate and number of applications will depend upon disease severity and weather conditions.

**Peas** - Begin application at early flowering and repeat 10 days later at early pod set or mid-flowering if necessary. Make a third application 10 to 14 days after the second application at pod fill or later flowering should conditions remain favourable for disease. Do not make more than 3 applications per season. Rates and the number of applications will depend upon disease severity and weather conditions.

## How it Works:

The active ingredient chlorothalonil is a chloronitrile fungicide with contact activity.

## Cost (2005 suggested retail prices):

$7.02 to $11.70/acre for wheat.
$5.62 to $11.70/acre for potatoes.
$9.36 to $18.72/acre for lentils.
$9.36 to $18.72/acre for chickpeas.
$9.36 to $14.04/acre for peas.

## Rate:

**Wheat** - 0.6 L to 1 L/acre for the control of Tan Spot and Septoria.

0.8 L to 1 L/acre for the suppression of Fusarium Head Blight.

**Potatoes** - 0.48 to 1 L/acre for control of late blight. 0.65 to 1 L/acre for control of early blight and botrytis stem rot.

**Lentils** - 0.8 to 1.6 L/acre.

**Chickpeas** - 1.2 to 1.6 L/acre for first application. 0.8 to 1.2 L/acre for subsequent applications.

**Peas** - 0.8 L to 1.2 L/acre for the control of Mycosphaerella blight.

## Water Volume:

Volume will vary with amount of plant growth. Use sufficient water to obtain adequate spray coverage. Spray volume will usually range from 90 to 640 L/acre for dilute sprays and 20 to 40 L/acre for concentrate sprays. For aerial application, use the recommended rate in a minimum of 12 L/acre.

**Chickpeas** - 90 L/acre. Ground application

## Tank Mixes:

**Fungicides:** On potatoes, Bravo may be applied with Quadris for the control of early blight. Do not apply sequential applications of this tank mix and do not exceed 3 tank mix applications per season. Do not apply to potatoes later than 2 days before harvest.

Do not combine with pesticides, surfactants or fertilizers unless prior use has shown the combination physically compatible and non-injurious under your conditions of use.

**Herbicides:** On lentils, do not apply in combination with Poast herbicide and Merge surfactant or within 48 hours of the application of Poast and Merge.

**Fertilizers:** None registered.

**Insecticides:** None registered.

## Restrictions:

**Grazing:** Do not graze treated areas. Do not feed straw from treated crop to livestock.

**Preharvest Interval:** Potato - 1 day.
Lentils and chickpeas - 48 days.
Wheat - 30 days.
Peas - 32 days.

**Recropping:** None.

**Application:** On lentils do not make more than 2 applications in the same season. On chickpeas, wheat and peas, do not make more than 3 applications per season. Do not apply by air for chickpeas.

**Storage:** Store in a cool, dry, ventilated place. Protect from excessive heat.

**Environment:** Do not apply if weather conditions favour drift from area being treated. Do not contaminate lakes, streams or ponds. Allow a buffer zone of 15 m between area being treated and aquatic systems for ground applications and a buffer zone of 100 m for aerial application.

**Re-entry:** Do not re-enter treated area within 48 hours. If required, and at least 4 hours have passed since application, individuals may re-enter treated area for short-term tasks not involving hand labour. Long pants, long-sleeved shirt, and chemical resistant gloves must be worn.

## Hazard Rating:

Warning, causes severe eye damage.

# Copper-based Fungicides

Fungicide Group – M
*(Refer to page 230)*

### Copper 53W/Copper Spray/Kocide 101/Kocide 2000/Kocide DF/ Parasol WP/Parasol Flowable

## Company:

United Agri Products, (Copper 53W – PCP# 09934, Copper Spray – PCP# 19146)

E.I. du Pont Canada Company (Kocide 101 – PCP# 14417, Kocide 2000 - PCP# 27348, Kocide DF – PCP# 24538)

Nufarm (Parasol WP – PCP# 24671, Parasol Flowable PCP# 25901)

## Formulation:

**Copper 53 W** - 53% tribasic copper sulphate formulated as a wettable powder.
Container size - 10 kg.

**Copper Spray** - 50% copper oxychloride formulated as a wettable powder.
Container size - 10 x 2 kg case.

**Kocide 101** - 50% copper as copper hydroxide formulated as a wettable powder.
Container size - 5 kg.

**Kocide 2000** - 35% copper as copper hydroxide formulated as a dry flowable
Container size - 10 kg.

**Kocide DF** - 40% copper as copper hydroxide formulated as a dry flowable.
Container size - 10 kg.

**Parasol WP** - 50% copper equivalent as copper hydroxide formulated as a wettable powder.
Container size - 10 kg.

**Parasol Flowable** - 24.4% copper equivalent as copper hydroxide formulated as a flowable.
Container size - 10L.

## Crops:

Potatoes, beans.

## Diseases Controlled:

| PRODUCT | POTATO | BEAN |
|---|---|---|
| Copper 53W | Early and late blight | Anthracnose<br>Downy Mildew<br>Bacterial Blight |
| Copper Spray | Early and late blight | |
| Kocide 101 | Early and late blight | Bacterial blight (bacterial and halo) |
| Kocide 2000 | Early and late blight | |
| Kocide DF | Early and late blight | |
| Parasol WP | Early and late blight | Bacterial blight (bacterial and halo) |
| Parasol Flowable | Early and late blight | Bacterial blight (bacterial and halo) |

## Crop Stage:

**Potatoes** - (Copper 53W, Copper Spray) - Apply when plants are 5 to 7 inches (12 to 18 cm) tall. Repeat at 7 to 10 day intervals.

(Kocide 2000) - Apply when plants are 15 cm tall at 7 to 10 day intervals.

(Kocide 101, Kocide DF, Parasol WP, Parasol Flowable) - Apply when plants are 6 inches (15 cm) tall. Apply combined with 0.7 to 0.9 kg of a mancozeb (80%) product per acre, at 7 to 10 day intervals. Kocide and Parasol may be applied with a desiccant at vine kill or alone after vine kill, prior to harvest, to reduce the risk of late blight tuber infection. See table for rates.

**Beans** - First application when plants are 6 inches (15 cm) tall, as a protectant. Repeat every 7 to 14 days depending on local conditions.

## How it Works:

The active ingredients tribasic copper sulphate, copper oxychloride and copper hydroxide are inorganic fungicides with contact activity.

## Cost (2005 suggested retail prices):

Copper 53W - $12.20/kg
Copper Spray - $12.41/kg
Kocide 101 - $10.86/kg
Kocide DF - $10.86/kg
Kocide 2000 - $10.84/kg
Parasol WP - $10.00/kg
Parasol Flowable - $15.60/L

## Rates:

| Product | Potato (kg/acre) | Acres treated by 1 container | Beans (kg/acre) | Acres treated by 1 container |
|---|---|---|---|---|
| Copper 53W | 2.2 | 4.5 | 2.2 | 4.5 |
| Copper Spray | 1.6 | 6.25 | | |
| Kocide 101 | 0.44 - 0.9<br>1.38 (vine kill) | 11.4 - 5.5<br>3.7 (vine kill) | 0.9 - 1.3 | 5.5 - 3.8 |
| Kocide 2000 | 0.32 - 0.64<br>0.96 (vine kill) | 31.3 - 15.6<br>10.4 (vine kill) | | |
| Kocide DF | 0.44 - 0.69<br>1.38 (vine kill) | 23 - 14.5<br>7.3 (vine kill) | | |
| Parasol WP | 0.44 - 1.0<br>1.36 (vine kill) | 23 - 10<br>7.3 (vine kill) | 0.9 - 1.3 | 11 - 7.7 |
| Parasol Flowable | 0.32 - 0.72 L/ acre<br>1 L/ acre (vine kill) | 31.3 - 13.9<br>10 (vine kill) | 0.92 - 1.25 L/ acre | 9.2 - 8 |

## Water Volumes:

**Kocide 101, DF** - Enough to ensure thorough coverage. Check label.

**Copper 53W, Copper Spray** - 88 gallons/acre (400 L/acre).

**Parasol WP, Parasol Flowable** - Enough to ensure thorough coverage.

## Tank Mixes:

**Fungicides:** Kocide 2000 - Can be combined with 0.7 - 0.9 kg/ acre of Manzate DF.

**Herbicides:** none registered.

**Fertilizers:** none registered.

**Insecticides:** none registered

## Restrictions:

**Application:** Do not apply Copper Spray, Copper 53W, Kocide 2000, Kocide 101, Parasol Flowable, and Parasol WP by air.

**Storage:** Store in cool, dry, ventilated area, away from feed or food. Keep away from heat, fire and sparks.

**Preharvest Interval:** 1 day.

**Environment:** Do not apply or allow to drift onto streams or any body of water.

## Hazard Rating:

Warning Poison (Copper 53W, Copper Spray)

Caution Poison (Kocide 101, Kocide 2000, Parasol Flowable, Parasol WP)

Danger Poison (Kocide DF)

# Curzate 60 DF

**Fungicide Group – U**
*(Refer to page 230)*

## Company

E.I du Pont Canada Company PCP# 26284

## Formulation:

60% cymoxanil formulated as a dry flowable.

Container size - 1.8 kg

## Crops:

Potatoes

## Diseases Controlled:

Late blight

## Crop Stage:

Use Curzate 60 DF only in a tankmix with Manzate DF. Do not use Curzate 60 DF alone.

Initial applications should start when local conditions indicate that late blight is imminent. Make additional applications at 5 to 7 day intervals. Apply no more than 7 applications per crop.

## How it Works:

The active ingredient cymoxanil is a highly active, locally systemic fungicide. It works at several levels of preventative, curative and inhibitive (against sporulation) activity.

The active ingredient mancozeb in Manzate DF is a dithiocarbamate fungicide with contact activity.

## Cost (2005 suggested retail price):

$11.65/acre.

## Rate:

Apply Curzate 60 DF at 0.09 kg/acre
Plus
Manzate DF at 0.54 - 0.65 kg/acre

## Water Volume:

Utilize sufficient water to obtain thorough coverage: 80 to 400 L/acre.

## Tank Mixes:

Do not use Curzate 60 DF alone. Use only in a tank mix with Manzate DF.

## Restrictions:

**Rainfall:** Curzate is rainfast within 2 hours after application.

**Re-entry:** Do not re-enter treated area within 24 hours.

**Preharvest Interval.** 8 days

**Application:** Do not apply by air.

**Storage:** Store product in original container in a secure, dry area away from food or feed. Protect against humid air and water. Not for use or storage in or around the home. Keep container tightly closed.

**Environment:** A buffer zone of 50m is required between the down-wind edge of the boom and sensitive aquatic habitats such as ponds, lakes, rivers, streams, and wetlands. Do not contaminate these habitats when cleaning and rinsing equipment or containers. Do not clean sprayer near well or water source or near desirable vegetation.

## Hazard Rating:

☠ Danger Poison

# Gavel 75 DF

**Fungicide Group – 22, M**
*(Refer to page 230)*

## Company:

Dow AgroSciences PCP# 26842

## Formulation:

66.7% mancozeb and 8.4% zoxamide formulated as a dry flowable. Container sizes: 3.5 kg, 20 kg, 25 kg

## Crops:

Potatoes

## Diseases Controlled:

Early and late blight

## Crop Stage:

Optimum disease control is achieved when the fungicide is applied in a regularly scheduled preventative spray program. Begin applications at the first sign of disease or when blight is reported in the area. Apply at 0.90 kg/acre every 7 days under high disease pressure when either disease is present and environmental conditions favour continued disease development. Gavel 75 DF can be applied at 0.68 kg/acre every 7 days under low disease pressure and environmental conditions unfavorable for disease development. Do not apply more than 6 applications per season.

## How it Works:

The active ingredient zoxamide is a benzamide fungicide with contact activity.

The mancozeb component is a dithiocarbamate fungicide with contact activity.

## Cost (2005 suggested retail price):

$13.33 to $17.65/acre.

## Rate:

Apply at 0.68 to 0.90 kg/acre

## Nozzles:

**Ground** – generally hollow cone, disc – D5 to D7. Consult spray nozzle accessory catalogues for specific information on proper equipment calibration.

**Aerial** – hollow cone brass nozzles with a D-series orifice disc and core (whirlplate) are recommended. Nozzles should point straight down or slightly backward.

## Water Volume:

Thorough, uniform coverage is essential for good disease control.

**Ground** – 90 L/acre.

**Aerial** – 18 to 36 L/acre. Use 36 liters of water under high disease pressure to provide better crop coverage.

## Effects of Weather:

Must be dry on plant leaf prior to rainfall.

## Tank Mixes:

None registered.

### Restrictions:

**Preharvest Interval:** 3 days.

**Recropping:** A 30 day plant back interval (PBI) is required for leafy vegetables and root and tuber vegetables. For all other crops not included on the label, the PBI should be 140 days.

**Storage:** Do not allow product to freeze. Keep away from fire and sparks. Store in a cool, dry, well ventilated place away from feed or food.

**Environment:**
***Ground application*** – a buffer zone of 25m for application by ground sprayer should be established between the last spray swath and the edge of aquatic systems. A buffer zone of 5m for application by ground sprayer should be established between the last spray swath and the edge of terrestrial habitats such as hedgerows, windbreaks, woodlots, vegetative strips and other vegetation.

***Aerial application*** – a buffer zone of 20m is required between the downwind edge of the boom and the closest edge of sensitive aquatic habitats.

**Re-entry:** do not re-enter treated areas within 48 hours of application.

### Hazard Rating:

**Caution** – causes moderate eye irritation. This product is a dermal sensitizer. Avoid contact with skin, eyes or clothing.

## Headline EC

**Fungicide Group – 11**
*(Refer to page 230)*

### Company:

BASF Canada PCP# 27322

### Formulation:

250 g/L of pyraclostrobin formulated as an emulsifiable concentrate

Container size: 6.5 L jug; 104 L tote

### Crops and Staging:

**Alfalfa (Seed production only):** Apply at the beginning of flowering (10-30% bloom) or at the onset of disease. Do not make more than 1 application per year. Do not apply by air.

**Wheat, barley, rye:** For control of leaf diseases apply single application immediately after flag leaf emergence; use higher rate to obtain extended protection; apply second application 10 to 14 days later if disease persists or weather conditions are favourable for disease development.

**Corn:** For optimum disease control begin all applications prior to disease development and continue on a 7 to 14 day interval if conditions are conducive to disease development.

**Chickpea, lentil, dry field pea, dry field bean, faba bean:** Apply at the beginning of flowering or at the onset of symptoms for the more aggressive diseases (anthracnose in lentil, ascochyta blight in chickpea); apply a second application 10 to 14 days later if disease persists or weather conditions are favourable for disease development. Anthracnose in lentils and ascochyta blight in chickpeas both develop quickly once established so early detection is critical.

**Potatoes:** Apply prior to row closure when conditions become favourable for the development of disease (whichever comes first); use higher rates and shorter spray intervals under heavy disease pressure; do not make more than 6 applications of Headline per season.

**Grasses grown for seed (bluegrass, fescue, ryegrass):** Apply prior to disease development; apply second application 14 to 21 days later if disease conditions persist.

### How it Works:

The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry used as a broad spectrum preventive and curative fungicide.

### Cost (2005 suggested retail price):

$16.57/acre at the 0.16 L/acre rate.

## Crops, Diseases Controlled and Rates:

**Cereals (Ground and aerial application)**

| Crop | Diseases controlled: | Rates (L / acre): |
|---|---|---|
| Wheat | Tan spot *(Pyrenophora tritici-repentis)*<br>Septoria leaf spot *(Septoria tritici; S. nodorum)*<br>Leaf rust *(Puccinia recondita)* | 0.12 – 0.24 |
| | Powdery mildew *(Erysiphe graminis* f. sp. *tritici)*<br>Spot blotch *(Cochliobolus sativus)*<br>Stripe rust *(Puccinia striiformis)* | 0.16 – 0.24 |
| Barley | Net blotch *(Pyrenophora teres)* | 0.12 – 0.24 |
| | Scald *(Rhynchosporium secalis)*<br>Spot blotch *(Cochliobolus sativus)*<br>Stripe rust *(Puccinia striiformis)* | 0.16 – 0.24 |
| Rye | Leaf rust *(Puccinia recondita)* | 0.12 – 0.24 |
| | Powdery mildew *(Erysiphe graminis)* | 0.16 – 0.24 |
| Corn* | Common rust *(Puccinia sorghi)* | 0.16 – 0.24 |

* Ground application only.

**Pulses (Ground and aerial application)**

| Crop | Diseases controlled: | Rates (L / acre): |
|---|---|---|
| Chickpea | Ascochyta blight *(Ascochyta* spp.) | 0.16 – 0.24 |
| Lentil | Anthracnose *(Colletotrichum truncatum)*<br>Ascochyta blight *(Ascochyta* spp.) | 0.16 |
| Field pea | Mycosphaerella blight *(Mycosphaerella* spp.)<br>Powdery mildew *(Erysiphe* spp.) | 0.16 |
| Dry beans *(Phaseolus* spp.) | Anthracnose *(Colletotrichum* spp.)<br>Powdery mildew *(Erysiphe* spp.)<br>Rust *(Uromyces* spp.) | 0.16 |
| Faba bean | Powdery mildew *(Erysiphe* spp.)<br>Rust *(Uromyces* spp.) | 0.16 |

**Grasses grown for seed (Ground application only)**

| Crop | Diseases controlled: | Rates (L / acre): |
|---|---|---|
| Bluegrass; fescue; ryegrass | Leaf and stem rust *(Puccinia recondita; P. graminis)*<br>Powdery mildew – suppression *(Erysiphe graminis)* | 0.16 – 0.27 |

**Alfalfa grown for seed (Ground application only)**

| Crop | Diseases controlled: | Rate (L / acre): |
|---|---|---|
| Alfalfa for seed production | Common leaf spot *(Pseudopeziza medicaginis)* | 0.16 |

**Soybeans (Ground and aerial application only)**

| Crop | Diseases controlled: | Rates (L / acre): |
|---|---|---|
| Soybeans | Frogeye leaf spot (*Cercospora sojina*) | 0.16 – 0.24 |

**Potato (Ground application only)**

| Crop | Diseases controlled: | Spray interval: | Rates (L / acre): |
|---|---|---|---|
| Potato | Early blight *(Alternaria solani)*<br>Late blight *(Phytophthora infestans)* | 7 to 14 days<br>5 to 7 days | 0.18 – 0.27<br>0.18 – 0.27 |

## Water Volume:

**Ground:** Use a minimum water volume of 40 L/acre on cereals, pulses and grasses and 80 L/acre on potatoes. Ensure thorough coverage of foliage.

**Aerial:** Use a minimum water volume of 20 L/acre. Ensure thorough coverage of foliage. Use the highest rate recommended for the disease being controlled.

## Tank Mixes:

None registered.

## Restrictions:

**Resistance:** Like any fungicide with a single mode of action, the quinone outside inhibitor fungicides, while highly effective, may result in resistant strains of fungi where they have been overused or misused.

When applying multiple applications in one season, pay close attention to the labelled recommendations for resistance management such as using labelled rates, rotating to fungicides outside group 11 and not exceeding the maximum number of applications per season.

**Grazing:** Do not graze treated corn crops within 6 days of last application. Do not feed alfalfa hay or forage to livestock. All other crops listed can be grazed or fed to livestock.

**Preharvest interval:** Cereals – apply no later than the end of flowering. Corn – 7 days, Pulses – 30 days. Grasses – 14 days. Soybeans – 21 days, Potatoes – 3 days.

**Recropping:** Crops listed on label may be planted immediately following last application. Wait 14 days before planting all other crops.

**Application:** Do not apply during periods of dead calm or when winds are gusty. For late blight control in potatoes, do not make more than one application of Headline before rotating to a different mode of action.

**Environment:** Avoid overspray or drift to sensitive habitats. Maintain specified buffer zones.

**Storage:** Store in a cool, dry, locked, well-ventilated area. Do not freeze.

## Hazard Rating:

☠ Danger Poison

Danger - Skin and eye irritant

# Kumulus DF

**Fungicide Group – M**
*(Refer to page 230)*

## Company:

BASF Canada PCP# 18836

## Formulation:

80% sulphur formulated as a water dispersible granular. Container size - 25 kg bag.

## Crop:

Field peas.

## Disease Controlled:

Powdery mildew.

## Crop Stage:

Spray at first appearance of disease and repeat at 7 to 10 day intervals as necessary.

## How it Works:

The active ingredient sulphur is an inorganic fungicide with contact activity.

## Cost (2005 suggested retail price):

$1.77/acre.

## Rate:

0.6 kg/acre (one bag treats 41 acres).

## Water Volume:

Minimum of 40 L/acre. Higher water volumes may be required later in the growing season. Use sufficient water volume to thoroughly cover all foliage.

## Effects of Weather:

Do not apply when rain or night frost is expected. Do not apply if temperature is above 27°C (in shade) and high humidity prevails, or if any of the above conditions are expected within 3 days after treatment. Do not apply under intense sunshine. Do not apply when weather favours drift.

## Tank Mixes:

Kumulus DF is miscible and compatible with Polyram DF.

Do not mix with dinitro compounds, tetradifon or oils.

## Restrictions:

**Preharvest Interval:** 1 day.

**Application:** Do not apply by air. Avoid drift onto neighbouring crops.

**Storage:** Keep away from heat, fire or sparks. Store in cool, dry, locked, well-ventilated area without floor drain.

**Caution:** Drift to off-target crops may cause leaf burn.

# Lance

**Fungicide Group – 7**
*(Refer to page 230)*

## Company:

BASF Canada PCP# 27495

## Crops:

Canola, dry beans, lentils, chickpeas, peas, and potatoes.

## Formulation:

70% boscalid formulated as a water dispersible granular (WDG).
Container size - 2 x 2.83 kg per jug.

## Crops, Diseases Controlled and Rates:

| Crop* | Disease | Application Rate (g/acre) | Application Timing |
|---|---|---|---|
| Canola | Sclerotinia stem rot *(Sclerotinia sclerotiorum)* | 142 | Apply at 20-50% flowering. Apply a second time 7-14 days later up to 50% bloom if disease persists, or weather conditions are favourable for disease development. |
|  | Black spot** *(Alternaria brassicae* and *A. raphani)* | 142 | Apply at late flowering to early green pod to control black spot. |
| Dry beans | White mold *(Sclerotinia sclerotiorum)* | 227 – 312 | Apply at 20-50% flowering. Apply a second time 7-14 days later if disease persists, or weather conditions are favourable for disease development. Use the higher rate to obtain extended protection and maximum yield benefit. |
| Chickpeas<br>Lentils | Ascochyta blight *(Ascochyta spp.)*<br>White mold *(Sclerotinia sclerotiorum)*<br>Gray mold *(Botrytis cinerea)* | 170 | Apply at the beginning of flowering. Apply a second time 7-14 days later if disease persists, or weather conditions are favourable for disease development. |
| Peas*** | Ascochyta blight (*Ascochyta* spp.)<br>Mycosphaerella blight (*Mycosphaerella* spp.)<br>Gray mold (*Botrytis cinerea*) | 170 | Apply at the beginning of flowering. Apply a second time 7-14 days later if disease persists, or weather conditions are favourable for disease development. |
| Potatoes*** | Early blight | 70 – 126 | Apply prior to disease development and at 14 day intervals if conditions continue to favour disease development. |

* Refer to the label for crops not detailed above. ** Suppression at the 20-50% bloom stage. *** DO NOT apply by air

## How it Works:

The active ingredient boscalid is an anilid fungicide. It provides a protective effect because it inhibits spores and spore germination.

## Cost (2005 suggested retail prices):

$22.58/acre for canola.
$36.10 to $49.61/acre for beans.

## Water Volume:

**Aerial Application:** Use a minimum water volume of 16 L/acre. Ensure thorough coverage of foliage.

**Ground Application:** Use a minimum water volume of 40 L/acre and ensure thorough coverage of foliage

## Application:

The product should be used in a preventative spray program and applied as a protectant.. When mixing use vigorous agitation. Do not allow the product to sit more then one hour without further vigorous agitation prior to application.

**Ground or Aerial Application:** Canola, dry beans, chickpeas and lentils.

**Ground Application Only:** Potatoes, peas.

## Effects of Weather:

Apply under favourable conditions to minimize or avoid the occurrence of drift. Aerial drift is increased under certain meteorological conditions therefore do not apply when wind speed is greater than 16 km/hour at flying height at the site of application

## Tank Mixes:

None registered.

Do not tank mix with any other products.

## Restrictions:

**Resistance:** Like any fungicide with a single mode of action, they are highly effective but may result in resistant strains of fungi where they have been overused or misused. Do not apply more than 2 applications of Lance fungicide before rotating to a different mode of action.

When applying multiple applications in one season, pay close attention to the labelled recommendations for resistance management such as using labelled rates, rotating to fungicides outside group 7 and not exceeding the maximum number of applications per season.

**Crop-Specific Restrictions and Limitations:**

| Crop* | Minimum Time from Application to Harvest (PHI) | Maximum Rate Per Acre Per Application (grams) | Maximum Number of Applications per season | Maximum Rate Per Acre Per Season (grams) |
|---|---|---|---|---|
| Beans, Dry | 21 days | 312 | 2 | 624 |
| Canola | 21 days | 142 | 2 | 284 |
| Chickpeas | 21 days | 170 | 2 | 340 |
| Lentils | 21 days | 170 | 2 | 340 |
| Peas | 21 days | 170 | 2 | 340 |
| Potatoes | 30 days | 128 | 4 | 504 |

* Refer to the label for crops not detailed above.

**Rainfall:** If rainfall is imminent, delay application.

**Grazing Restrictions:** All crops can be grazed or fed to livestock.

**Re-Entry Interval:** Do not re-enter treated area for 4 hours after application or until dry.

**Drift:** Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed

**Recropping:** A plant back restriction of 14 days is required for all crops not on the label.

## Hazard Rating:

Caution Poison

Potential Skin Sensitizer

Warning - Eye Irritant

# Mancozeb-based Fungicides

**Fungicide Group – M**
*(Refer to page 230)*

**Dithane DG Rainshield NT/Manzate DF/Penncozeb 75 DF**

## Company:

Dow AgroSciences (Dithane DG Rainshield NT – PCP# 20553)

E.I du Pont Canada Company (Manzate DF – PCP# 21057)

Cerexagri; distributed by United Agri Products (Penncozeb 75 DF – PCP# 25397)

## Formulations:

Dithane DG Rainshield NT - 75 % mancozeb formulated as a dispersible granule. Container size - 20 kg.

Manzate DF - 75 % mancozeb formulated as a dry flowable granule. Container sizes - 20 kg, 2.5 kg.

Penncozeb 75 DF - 75 % mancozeb formulated as a dry flowable powder. Container sizes - 20 kg.

## Crops:

Potatoes
Wheat
Lentils (Dithane DG Rainshield NT only)
Seed alfalfa (Dithane DG Rainshield NT only)

## Diseases Controlled:

| | DITHANE DG RAINSHIELD NT | MANZATE DF PENNCOZEB 75 DF* |
|---|---|---|
| Wheat | Tanspot, leaf rust, Septoria leaf blotch | Tanspot, leaf rust, Septoria leaf blotch |
| Lentils | Anthracnose and ascochyta blight | |
| Potatoes | Early and late blight | Early and late blight |
| Seed Alfalfa | Leaf spot and stem spot diseases | |

## Crop Stage:

**Potatoes** - Apply when plants are 4 to 6 inches (10 to 15 cm) high; repeat at 7 to 10-day intervals. Start with low rate and increase to maximum as foliage develops. The spray interval may be reduced to 5 to 6 days during periods of wet weather favoring late blight and/or vigorous crop growth.

**Wheat** - May be applied early (when crop is in the 3 leaf to tillering stage) and/or late (when head is fully emerged, but prior to flowering). Do not make more than 2 applications per season.

**Lentils** – Apply the first application before flower when bud formation is evident. A second application should be applied 10 to 14 days after the initial application, but before rows close in to form a dense canopy. If conditions for disease development persist, a third application may be applied 10 to 14 days later. Do not apply more than 3 applications of Dithane DG per season.

**Seed Alfalfa** - Apply first application prior to 50% bloom. Repeat 7 to 10 days after the first application and 10 days after the second application. Do not make more than 3 applications per season.

## How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity.

## Cost (2005 suggested retail prices):

$3.64 to $7.95/acre.

## Rates:

**Potatoes** - 0.45 to 0.90 kg/acre.

**Wheat (early)** - 0.45 kg/acre; **wheat (late)** - 0.9 kg/acre.

**Lentils** - 0.9 kg/acre.

**Alfalfa** - 0.6 kg/acre.

## Nozzles:

Dithane DG Rainshield NT - flat fan.

## Water Volume:

Thorough, uniform coverage is essential for good disease control.

Manzate DF - 80 to 400 L/acre by ground sprayer; 20 to 32 L/acre by air.

Penncozeb 75 DF - 40 L/acre for ground application; 18 L/ac for aerial application

Dithane DG Rainshield NT - 40 to 80 L/acre for ground application; 18 L/acre for aerial application.

### Effects of Weather:

Dithane DG Rainshield NT - must be dry on plant leaf prior to rainfall; approximately 1 hour is required without rainfall at moderate temperatures and humidity.

### Tank Mixes:

None registered.

For Dithane DG Rainshield NT, add other co-applied fungicides, insecticides, growth regulators, micronutrients and spray adjuvants to the tank last. Do not let Dithane DG Rainshield NT settle out in unagitated spray tank.

### Restrictions:

**Grazing:** Do not graze or feed treated straw or plant tops to livestock.

**Preharvest Interval:** Potatoes - 1 day.
Lentils – 35 days.
Wheat - 40 days.

**Storage:** Store in cool, dry, well-ventilated place. Keep away from fire and sparks.

**Environment:** Do not apply if weather favours drift from areas treated. Do not apply to water or wetlands.

### Hazard Rating:

◈ Warning Poison - Eye irritant

## Polyram DF

Fungicide Group – M
*(Refer to page 230)*

### Company:

BASF Canada PCP# 20087

### Formulation:

80% metiram formulated as dry flowable.

Container size - 20 kg.

### Crops:

Potatoes.

### Diseases Controlled:

Early blight, late blight

### Crop Stage:

Apply at 7 to 10 day intervals using 0.45 to 0.71 kg/acre until plants cover the row. Then increase the rate to 0.91 kg/acre until tops are killed, or use 0.45 to 0.71 kg/acre at 5 to 7 day intervals starting when plants are 15 cm high and continuing until top killing. When conditions (rain or dew) favour infections, use the shorter intervals in each case.

### How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity.

### Cost (2005 suggested retail price):

$3.71 - 7.51/acre.

### Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** Polyram DF can be mixed with liquid fertilizers after a physical compatibility test has been conducted.

**Insecticides:** Mixtures with Diazinon or Malathion should be prepared immediately prior to use and not allowed to stand in the tank.

**Fungicides:** None registered.

### Rates:

0.45 to 0.91 kg/acre

### Water Volumes:

**Ground application:** 40 to 80 L /acre.

**Aerial application:** 22 L /acre.

### Nozzles:

Hollow cones or flat fans recommended.

## Restrictions:

**Resistance:** Where possible, rotate the use of Polyram DF or other group M fungicides with different modes of action that control the same pathogens.

**Grazing:** Do not use treated crop parts for feed or food.

**Preharvest Interval:** May be applied up to the day before harvest.

**Recropping:** None.

**Storage:** Store in a cool, dry place away from flame or sparks. If product becomes wet or overheated, effectiveness is reduced and flammable vapors may be produced. Do not freeze.

**Environment:** Do not apply when environmental conditions favor drift from treated area. Do not contaminate domestic or irrigation water, lakes, streams or ponds by the cleaning of equipment or otherwise.

## Hazard Rating:

Caution: Potential skin sensitizer.

# Propiconazole-based Fungicides

**Tilt 250E/Bumper 418 EC**

**Fungicide Group – 3**
*(Refer to page 230)*

## Company:

Syngenta (Tilt 250E PCP# 19346)

Makhteshim-Agan; distributed by United Agri Products (Bumper 418 EC - PCP #28107)

## Formulations:

Tilt 250E - 250 g/L propiconazole formulated as an emulsifiable concentrate. Container sizes - 5 L, 4 x 5 L.

Bumper 418 EC - 418 g/L propiconazole formulated as an emulsifiable concentrate. Container size - 10 L

## Crops:

Winter and spring wheat (including hard red, durum, Canada Prairie, soft white)
Spring Barley
Oats
Canaryseed
Canola
Corn
Beans
Soybeans (grown for seed)
Timothy

## Diseases Controlled:

| CROP | DISEASES CONTROLLED |
|---|---|
| Wheat | Septoria leaf spot, Tan spot, Septoria glume blotch, Stripe rust, Powdery mildew, Leaf and stem rust |
| Barley | Spot blotch, Net blotch, Scald, Leaf rust, Stem rust, Septoria leaf spot, Powdery mildew |
| Oats | Septoria leaf blotch, Crown rust |
| Corn | Rust, Northern leaf blight |
| Canola | Blackleg |
| Beans (kidney, navy and white) | Rust |
| Soybeans (grown for seed) | Frogeye leaf spot |
| Timothy | Purple eyespot |

## Diseases Suppressed:

Canaryseed – Septoria leaf mottle

## Crop Stage:

**Wheat, barley, oats:** Apply at the very early stage of disease development, anytime from the beginning of stem elongation to before the head is half emerged. Best results have been achieved when applied just when the flag leaf emerges. Tilt 250E last about 3 weeks in the plant. If conditions favourable to disease continue, another application may be necessary. The second application is usually applied at the time of head emergence.

**Canaryseed:** Apply at emergence of flag leaf.

**Canola:** Apply during the rosette stage (after second true leaf and prior to bolting).

**Beans:** Apply at the first detection of disease in the field. A second application may be made 14 to 21 days later.

## How it Works:

The active ingredient propiconazole is a triazole fungicide with broad-spectrum systemic activity.

## Cost (2005 suggested retail price):

Tilt 250E - $13.97/acre.
Bumper 418 EC - $7.55/acre.

## Rate:

Tilt 250E - 0.2 L/acre. One 5 L container treats 25 acres.
Bumper 418 EC - 0.12 L/acre.

## Water Volume:

**Ground:** Minimum 80 L/acre.

**Air:** 16 to 20 L/acre.

## Nozzles:

**Ground:** Flat fan.

**Air:** Flat fan or hollow cone.

## Tank Mixes:

**Herbicides:** In wheat and barley only, Tilt 250E or Bumper 418 EC may be applied with: 2,4-D amine, estimine 2,4-D, MCPA amine, estimine MCPA, Buctril-M or Pardner. In wheat only, Tilt 250E or Bumper 418 EC may be applied with Horizon.

To ensure weed and disease control:

1. Weeds and crops must be at correct growth stage.
2. Tank mixes of Tilt 250E or Bumper 418 EC and Buctril-M, Horizon or Pardner can only be applied by ground.
3. 2,4-D and MCPA formulations can be applied by ground or air.

**Fertilizers:** Tilt 250E or Bumper 418 EC may be applied with small amounts of nitrogen. Rate of actual N not to exceed 4 kg/acre (9lb/acre). Add the nitrogen to the spray tank before adding Tilt 250E or Bumper 418 EC. Excessive nitrogen or application during hot weather may result in crop injury. Do not add nitrogen when tank-mixing Tilt 250E or Bumper 418 EC with a herbicide.

**Insecticides:** In field corn, Tilt 250E or Bumper 418 EC can be applied with only one of the following: Matador or Ripcord.

**Fungicides:** None registered.

## Effects of Weather:

If rainfall occurs within 1 hour of application, reapplication is necessary. For aerial application, wind speed should be less than 18 km/hr to avoid drift. High humidity and low temperature (10 to 20°C) allow for better deposition of spray droplets.

## Restrictions:

**Grazing:** Do not graze animals on treated green crops within 3 days of application. Do not feed straw treated with herbicide tank mixes to livestock.

**Preharvest Interval:** Wheat, oats, barley - 45 days. Canola - 60 days. Corn - 14 days if tank-mixed with an insecticide. Beans – 28 days. Soybeans - 50 days.

**Recropping:** None.

**Aerial Application:** On timothy, do not apply by air.

**Storage:** Do not freeze.

**Environment:** Do not contaminate food or feed. This pesticide is toxic to fish. Do not spray any body of water by direct application, drift or by cleaning equipment.

## Hazard Rating:

Caution Poison

# Quadris

**Fungicide Group – 11**
*(Refer to page 230)*

## Company:

Syngenta PCP# 26153

## Formulation:

250 g/L azoxystrobin formulated as a flowable suspension concentrate

Container size – 4 x 3.78 L jugs

## Crops:

Canola, chickpeas, lentils, peas, beans and potatoes

## Diseases Controlled:

**Canola** - Blackleg, Sclerotinia stem rot and Alternaria black spot.

**Chickpeas** - Ascochyta blight.

**Lentils** – Anthracnose and Ascochyta blight.

**Field Peas** – Mycosphaerella blight

**Beans** – Anthracnose

**Potatoes** – Early blight and Late blight; Rhizoctonia stem rot, stolon canker and black scurf

## Crop Stage:

**Canola**

***Blackleg:*** Apply at the 2 to 6 leaf stage of canola.

***Sclerotinia stem rot:*** Apply at early bloom (prior to 30% bloom). This will also suppress alternaria black spot.

***Alternaria black spot:*** Apply at early pod stage (90% petal fall).

**Chickpeas, Lentils, Field Peas, Beans**

Make first application no later than onset of flowering. Second application 10 to 14 days later.

## How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) used as a broad spectrum preventative and curative fungicide.

## Cost (2005 suggested retail price):

$20.37/acre for control of blackleg and alternaria black spot.
$28.51 to $40.73/acre for control of sclerotinia stem rot.
$20.37/acre per application on legumes.
$20.37 to $32.59/acre per application on potatoes.

## Rate:

**Canola**

***Blackleg and alternaria black spot:*** Use 0.2 L/acre.
***Sclerotinia stem rot:*** Use 0.28 to 0.4 L/acre. Use the higher rate if there is a history of sclerotinia stem rot infection in the area and when conditions favour development (heavy crop canopy, high humidity and/or excessive rain).

**Chickpeas, Lentils, Field Peas, Beans**

For each application use 0.2L/acre.

**Potatoes**

***Early blight:*** 0.2 to 0.32 L/acre starting prior to disease development
***Late blight:*** 0.32 L/acre starting prior to disease development
***Rhizoctonia stem rot, stolon canker and black scurf:*** (in-furrow treatment) 4 to 6 mL/100m of row, applied at planting.

## Water Volume:

**Ground:** Use sufficient water volume to obtain adequate coverage. Use minimum 40 L/acre. In-furrow treatment in 20 to 57 L/acre.

**Aerial:** Use minimum of 18 L/acre. Ensure uniform application.

## Tank Mixes

**Herbicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** On potatoes, Quadris may be applied with Bravo for the control of early blight. Do not apply sequential applications of this tank mix and do not exceed 3 tank mix applications per season. Do not apply to potatoes later than 2 days before harvest.

## Restrictions:

**Resistance:** Like any fungicide with a single mode of action, the quinone outside inhibitor fungicides, while highly effective, may result in resistant strains of fungi where they have been overused or misused.

When applying multiple applications in one season, pay close attention to the labelled recommendations for resistance management such as using labelled rates, rotating to fungicides outside group 11 and not exceeding the maximum number of applications per season.

**Grazing:** Do not feed dried pea vines to livestock.

**Preharvest Interval:** Canola - 30 days. Legumes – 15 days. Potatoes – 1 day; 90 days for in-furrow application

**Recropping:** Do not plant broadleaf or root crops within 30 days of application. Do not plant cereals within 45 days of application.

**Application:** In-furrow application: Mount the spray nozzle so that spray is directed into the furrow as a 15-20 cm band just before the seed is covered. Do not apply through irrigation equipment.

Do not exceed 2 applications or 0.56 L/acre per season on legume crops. Do not exceed 3 applications or 0.96 L/acre per season on potatoes. Do not apply sequential treatments of Quadris to potatoes but apply in alternation with fungicides that have a different mode of action and to which disease resistance has not developed.

Do not apply if rainfall is imminent. Do not apply during periods of dead calm, when winds are gusty or when wind speed is greater than 15 km/hr at 2 m above ground at the site of application.

**Environment:** For ground application maintain a 1 m buffer zone between areas sprayed and aquatic systems.

For aerial application allow a 6 m buffer zone. Quadris can be extremely phytotoxic to certain apple varieties. Do not apply where there is the possibility of spray drift reaching apple or crabapple trees.

**Storage:** Store in a cool, dry, well-ventilated area. Do not store below 0°C

## Hazard Rating:

None.

# Reason 500SC

**Fungicide Group – 11**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 27462

## Formulation:

500 g/L fenamidone. Container sizes – 2, 4 or 10 L.

## Crops:

Potatoes.

## Diseases Controlled:

Early and late blight.

## Crop Stage:

Begin application when plants are 15 to 20 cm high or when disease threatens. Apply a fungicide with a different mode of action within 7 to 10 days after each application using the shorter interval when conditions favor disease development. Ensure even application.

## How it Works:

The active ingredient fenamidone is a member of the strobilurin class of chemistry and has preventative and protectant activity, inhibiting spore germination and sporulation.

## Cost (2005 suggested retail price):

$7.92/acre.

## Rate:

Apply at 80 mL per acre as a tank mix with either Dithane DG* at 500 g/ac or Bravo 500 at 500 mL/ac. *When using other formulations of mancozeb, adjust application rates to apply 375 g active ingredient per acre.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** To be applied ONLY as a tank mix with mancozeb-based fungicides or Bravo 500. Follow mixing instructions provided on the label.

## Restrictions:

**Application:** Do not apply by air or through any type of irrigation system. Do not exceed 6 applications or 0.48 L/ac in a year. Alternate with fungicides having a different mode of action.

**Resistance:** The strobilurin fungicides, while highly effective, have quickly led to resistant strains of fungi where they have been overused or misused. Especially where multiple applications in one season are considered, pay close attention to the labeled recommendations for resistance management.

**Rainfall:** Reason is rainfast within 2 hours of application.

**Preharvest Interval:** 14 days.

**Recropping:** A 30 day plantback interval is required for potatoes and all other crops.

**Environment:** Maintain an 8 m buffer zone between areas sprayed and aquatic systems. Toxic to fish and other aquatic organisms; do not apply where runoff is likely to occur.

**Storage:** Do not allow product to freeze. If stored more than 1 year, shake well before using. Keep away from fire, open flame or other sources of heat. Store in tightly closed container away from fertilizer, seeds, feed or food.

## Hazard Rating:

Caution: Eye Irritant.

# Ridomil Gold/Bravo

**Fungicide Group – 4, M**
*(Refer to page 230)*

## Company:

Syngenta PCP# 26443

## Formulation:

500 g/L chlorothalonil and 480 g/L metalaxyl-M in a Twin-Pak Jug. Container size - 8.83 L.

## Crops:

Potatoes.

## Diseases Controlled:

Early blight, late blight, late blight tuber rot, Botrytis vine rot.

Suppression of Pythium leak and Pink rot.

## Crop Stage:

Begin preventive applications, early in the season when conditions are favorable for disease, (before infection), but no later than when the plant foliage meets within the row uniformly across the field. Apply a second and third application at 14-day intervals. The labelled rate of a registered contact fungicide should be applied 7 days after each application. Do not make more than three applications per season.

## How it Works:

The metalaxyl component is an acylalanine fungicide with systemic activity.

The chlorothalonil component is a chloronitrile fungicide with contact activity.

## Cost (2005 suggested retail price):

$30.43/acre.

## Rate:

One 8.83 L jug treats 10 acres. The entire contents of the jug must be added to the spray tank or an improper mixture will result.

## Water Volume:

**Ground:** use sufficient water to ensure thorough coverage of foliage. Use a water volume of 90 to 640 L/acre.

**Aerial:** use a minimum water volume of 20 L/acre.

## Tank Mixes:

None registered.

## Restrictions:

**Resistance: Strains of late blight resistant to metalaxyl may develop especially when applied after disease is present. If late blight develops in the field, contact government Potato Specialist or Plant Disease Specialist.**

**Application:** Do not make more than 3 applications per season.

**Storage:** Protect from excessive heat.

**Environment:** Do not apply where runoff is likely to occur. Do not use on coarse textured gravelly soils, soils with less than 2% organic matter or in areas where the water table may be high. Avoid application when weather favors drift. Avoid application by ground or air near or around bodies of water. Do not contaminate streams or ponds by spray drift, by cleaning equipment, or disposal of wastes. A buffer zone of 100 m for aerial application and 15 m for ground application should be observed to protect water bodies.

## Hazard Rating:

Warning Poison

Warning, causes severe eye damage.

# Ronilan EG

**Fungicide Group – 2**
*(Refer to page 230)*

## Company:

BASF Canada PCP# 24894

## Formulation:

50% vinclozolin formulated as an extruded granular fungicide.

Container size - 12 kg (1.2 kg/PVC bag, 2 x 1.2 kg/pouch, 5 x 2.4 kg/pouch per box).

## Crops:

Canola, beans.

## Disease Controlled:

**Canola** - Sclerotinia stem rot.

**Beans** - Sclerotinia (white mold) and Botrytis (grey mold).

## Crop Stage:

**Canola** - Apply once at 20 to 50% bloom, usually 4 to 8 days after first blooms appear in field. For two applications, apply first at early bloom (20 to 30%) with a second application 7 days later at late bloom (50%) if the disease persists or weather conditions are favourable for disease develoment.

**Beans** - Apply at early to mid bloom (30 to 50%). Apply a second time 7 to 14 days later at full bloom if disease persists, or weather conditions are favourable for

## How it Works:

The active ingredient vinclozolin is an dicarboximide fungicide with contact activity.

## Cost (2005 suggested retail prices):

**Canola** - $13.67 to $27.33/acre

**Beans** - $27.33 to $41.00/acre

## Rate:

**Canola** - For one application, 0.30 to 0.40 kg/acre. The high rate is used when conditions favor sclerotinia development (heavy crop canopy, high humidity, and/or excessive rain).

For split applications, 0.2 kg/acre per treatment at early bloom (20 to 30%) and again 7 days later at late bloom (50%).

**Beans** - 0.4 kg/acre if using 2 applications/year, 0.6 kg/acre if using 1 application/year. Do not apply more than 0.8 kg/acre per season.

## Water Volume:

**Canola (by ground)** - 45 to 90 L/acre.

**Canola (by air)** - Use minimum 16 L/acre.

**Beans (by ground only)** - Use sufficient spray volume to obtain thorough coverage of foliage. Use 10 to 20 gallons/acre (45 to 90 L/acre).

## Pressure:

Minimum 275 kPa (40 psi).

## Effects of Weather:

Do not apply if rain or frost is expected. If rainfall is imminent, delay spraying. Do not treat plants at very low temperatures. Do not apply to any crops that have been stressed due to conditions such as flooding, drought, etc. For aerial application, apply when wind is less than 8 km/hr.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** Do not tank mix products that may contain boron.

**Insecticides:** Lorsban and Pyrinex. See label for details on rates. Ronilan EG must be added first to mix.

**Fungicides:** None registered.

## Restrictions:

**Grazing:** Do not allow livestock to graze on treated crop.

**Preharvest Interval:** 45 days for beans, 40 days for canola.

**Storage:** Store in original, tightly closed container in cool, dry, locked, well ventilated area without floor drain. Ronilan may be frozen.

**Environment:** For ground application, maintain 15 m buffer zone between area sprayed and aquatic systems, for aerial application allow a 100 m buffer zone.

## Hazard Rating:

☠ Caution Poison

# Rovral Flo

**Fungicide Group – 2**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 24378

## Formulation:

240 g/L iprodione formulated as a liquid flowable.
Container size - 8.4 L.

## Crop:

Canola.

## Diseases Controlled:

Sclerotinia stem rot and Alternaria black spot.

## Crop Stage:

**Sclerotinia stem rot:** Apply when the canola crop is in the 20 to 50% bloom stage. This will be approximately 4 to 8 days after the canola crop begins to flower. Best protection will be achieved when the fungicide is applied at the 20 to 30% bloom stage - prior to petals beginning to fall. Rovral Flo fungicide can be applied until the 50% bloom stage - when the canola crop is at its maximum yellow color, and prior to significant petal fall.

**Alternaria black spot:** Apply as a single spray at early green pod, or as split application: the first at full bloom, followed by a second application at early green pod stage. Early green pod stage occurs when almost all canola pods are fully formed and still green with only a few flowers or undeveloped pods remaining at the top of the plant. Good coverage of plants is essential.

## How it Works:

The active ingredient iprodione is a dicarboximide fungicide with protective and eradicant activity.

## Cost (2005 suggested retail price):

$16.46, $22.21 or $32.66/acre.

## Rate:

**Sclerotinia stem rot (white mold):** 0.63. 0.85 or 1.25 L/acre. The 0.85 L/acre rate is the recommended for most canola crops, however, use of the higher rate is recommended for fields with a history of severe disease pressure. Split applications: 0.42 to 0.63 L/ac at 20 percent bloom stage followed by 0.42 L/ac at 50 percent bloom stage.

**Alternaria black spot:** A single application of 0.85 L/acre at early green pod. Split applications: 0.42 L/acre at full bloom followed by 0.42 L/acre at early green pod stage of canola.

## Water Volume:

**Ground:** 40 L/acre

**Air:** Not less than 18 L/acre

## Nozzles:

Flat fan or hollow cone for ground and properly calibrated aerial equipment.

## Tank Mixes:

None registered.

Rovral should not be mixed with other pesticides, adjuvants or fertilizers except where stated.

## Effects of Weather:

Do not spray in heavy dew or when rain is imminent within one hour. Spraying should be carried out in crosswind where possible. Avoid spraying in a dead calm and when wind speeds exceed 20 km/hr.

## Restrictions:

**Application:** Do not make more than 2 applications per season

**Preharvest Interval:** 38 days

**Storage:** Protect from frost.

## Hazard Rating:

Caution Poison

# Senator 70WP

**Fungicide Group – 1**
*(Refer to page 230)*

## Company:

Engage Agro Corporation PCP# 25343

## Formulation:

70% thiophanate-methyl formulated as wettable powder.

Container size - 2 kg.

## Crop:

White beans.

## Diseases Controlled:

Sclerotinia (white mold).

## Crop Stage:

Apply when conditions favour disease development (i.e. , warm, humid weather and heavy, dense foliage). This usually occurs during early bloom stage, prior to rows closing in. If conditions favouring disease persist, repeat applications may be warranted.

### How it Works:

The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity.

### Cost: (2005 suggested retail price)

$57.65 to $74.09/acre.

### Rate:

0.7 to 0.9 kg/acre (one container treats 2.14 to 1.67 acres).

### Water Volume:

40 to 90 L/acre (by ground).
20 to 24 L/acre (by air).

### Nozzles:

Ground - Flat fan.

Air - Hollow cone.

### Tank Mixes:

None registered.

Senator 70WP is compatible with most pesticides.

Do not mix with lime or other alkaline materials.

### Restrictions:

**Resistance: Experience has shown that strains of fungi resistant to thiophanate-methyl may develop in treated crops.**

**Grazing:** Do not feed or allow livestock to graze on treated crops.

**Storage:** Store in a dry place.

## Stratego 250EC

**Fungicide Group – 3, 11**
*(Refer to page 230)*

### Company:

Bayer CropScience PCP# 27528

### Formulation:

125 g/L propiconazole and 125 g/L trifloxystrobin formulated as an emulsifiable concentrate. Container size - 2 x 8 L case

### Crops:

Spring Wheat (including Hard Red, Durum, Canada Prairie, Soft White) and Winter Wheat

### Diseases Controlled:

Septoria leaf blotch, Tan spot, Powdery mildew, Leaf and Stem rust, Stripe rust

### Crop Stage:

Single application – 4-leaf stage up to early heading (GS 14 to 55).

Two applications – First at 4-leaf to flag leaf stage. Second before early heading but not within 14 days of first application.

Apply at the very early stages of disease development. Typically, one application from tillering up to flag leaf emergence is required.

### How it Works:

The active ingredient propiconazole is a triazole fungicide with broad spectrum systemic activity.

The active ingredient trifloxystrobin is a strobilurin fungicide with broad spectrum preventative activity.

### Cost (2005 suggested retail price):

$10.81/acre.

### Rate:

0.2 L/acre.

## Water Volume:

**Ground:** 40 to 80 L/acre)

**Air:** Not less than 20 L/acre

## Effects of Weather:

If rain occurs within one hour of application, reapplication may be necessary.

Avoid spraying in a dead calm or when winds are gusty.

## Tank Mixes:

**Herbicides:**

***Crop:*** In wheat (winter, spring, durum) Stratego 250EC may be applied with Buctril M at 0.4 L/acre when plants are at the 4-leaf stage up to the early flag leaf stage. In spring wheat and durum only, Stratego 250 EC may be applied with Buctril M at 0.4 L/acre plus Puma$^{120}$ Super at 0.155 or 0.310 L/acre when plants are at the 4-leaf stage up to the 3rd tiller stage. Do not apply Stratego 250EC mixed with Puma$^{120}$ Super 2-3 days prior to or following cold temperatures (3°C or lower) as crop injury may occur.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

## Restrictions:

**Application:** Do not make more than 2 applications per season.

**Grazing:** Do not graze or harvest as forage if 2 applications made in one season. If a single application is made, do not allow livestock to graze or harvest as forage within 30 days after application.

**Preharvest Interval:** 45 days

**Recropping:** A plant back restriction of 14 days is required for all crops not on the label

**Environment:**. Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed.

## Hazard Rating:

Danger – Eye irritant, potential skin sensitizer

# Tanos 50 DF

**Fungicide Group – 11, U**
*(Refer to page 230)*

## Company:

E.I. duPont Canada Company PCP# 27435

## Formulation:

25% famoxadone and 25% cymoxanil as a dry flowable.

## Crops:

Potatoes.

## Diseases Controlled:

Early and late blight.

## Crop Stage:

Make the first application following one or two applications of a preventative broad spectrum fungicide such as chlorothalonil or mancozeb. Tanos may be applied on a 7-day interval, but it is recommended to alternate with a fungicide having a different mode of action to prevent resistance.

## How it Works:

The active ingredient cymoxanil is a highly active, locally systemic fungicide. It works at several levels of preventative, curative and inhibitive (against sporulation) activity. The active ingredient famoxadone is a member of the strobilurin class of chemistry used as a broad spectrum preventative and curative fungicide.

## Cost (2005 suggested retail price):

N/A

## Rate:

Apply at 225 to 340 g/ acre.

## Water Volume:

Use sufficient water to obtain thorough coverage. With a conventional sprayer use no less than 100 to 120 L/ acre. With an air-assisted sprayer use no less than 44 L/ acre. Ground application only.

## Effects of Weather:

Do not apply during periods of dead calm or when winds are gusty. Tanos Fungicide must not be applied to any crop suffering from stress as a result of drought, water logging, low temperatures, insect attacks, nutrient or lime deficiency or other factors reducing crop growth.

## Tank Mixes:

None registered.

## Restrictions:

**Application:** Do not apply Tanos to more than 500 acres per day. Do not apply by air. Do not make more than 6 applications per year. Tank mix solutions containing boron may affect product solubility. When using boron containing solutions, add the correct amount of Tanos first and boron containing solution last.

**Resistance: Plant diseases can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecast and recommendations.**

**Rainfall:** Rainfast within 12 hours of application.

**Preharvest Interval:** 14 days.

**Recropping:** Crops that are on the product label (potatoes and field tomatoes) may be planted back at any time. A 30-day plantback interval is required for cereal grains. All other crops may be planted following a 1 year interval.

**Re-entry:** Do not re-enter treated areas within 24 hours of application.

**Environment:** Toxic to fish and aquatic organisms. Observe prescribed buffer zones. Toxic to birds, mammals and harmful to beneficial arthropods. Minimize off-target drift to reduce the effects on wildlife at the field boundary. Do not apply to areas prone to run-off and delay spraying if rainfall is imminent.

## Hazard Rating:

Warning Poison

Eye Irritant.

# Tattoo C

**Fungicide Group – 28, M**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 24544

## Formulation:

375 g/L propamocarb HCl and 375 g/L chlorothalonil formulated as a suspension. Container size - 10 L.

## Crops:

Potatoes.

## Disease Controlled:

Late blight.

## Crop Stage:

Begin applications when conditions are favorable for disease, but before infection, and continue on 7 to 14-day intervals until threat of disease is over. Use the 7-day interval when the risk and conditions for disease are high. To avoid resistance, rotating and alternating applications with fungicides having different modes of action is recommended if multiple fungicide applications are required. Make no more than 3 applications per season.

## How it Works:

The active ingredient propamocarb HCl is a carbamate fungicide with systemic activity. Chlorothalonil is a chloronitrile fungicide with contact activity.

## Cost (2005 suggested retail price):

$27.14/acre

## Rate:

1.09 L per acre.

## Water Volume:

80 to 120 L/acre.

## Tank Mixes:

None registered.

## Restrictions:

**Application:** Do not apply by air. Treatment with any product containing chlorothalonil must be separated by a minimum of 7 days.

**Resistance:** Plant disease fungi can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecasts and recommendations.

**Grazing:** Do not feed treated crops to livestock.

**Preharvest Interval:** 7 days.

**Recropping:** Do not plant a new crop in the treated area within 120 days of the last application.

**Re-entry:** Do not re-enter treated areas within 48 hours after treatment. If required, individuals may re-enter treated areas within 48 hours for short tasks not involving hand labour, provided that 4 hours have passed since application and that long pants and a long-sleeve shirt are worn.

**Storage:** Keep away from fire, open flame or other sources of heat. Do not store below freezing. Store the tightly closed container away from seeds, fertilizers, plants and foodstuffs.

**Environment:** Do not apply directly to water or areas where surface water is present. Do not apply where runoff is likely to occur. Do not contaminate water when disposing of equipment wash waters. Allow a buffer zone of 15 m around bodies of water when applying.

## Hazard Rating:

Danger – Corrosive to eyes

Potential skin sensitizer

# Tilt 250E

**See Propiconazole-based Fungicides**

# Seed Treatment Directory

**Table 6. Seed Treatments in Field Crops**

|  |  |  |  |  |  |  |  | CROP DISEASES/INSECTS CONTROLLED |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | POTATO SEED PIECE |  |  |  |  |  |  | SEED AND SEEDLING ROTS/BLIGHTS |  |  |  |  |  |  |  |  |  |  |  |  |  | SMUTS CARRIED ON SEED |  |  |  |  |  |  | SMUTS IN SEED |  | Blackleg | Alternaria Black Spot | INSECTS |  |  |  |  |
| **PRODUCTS** | Page | Blackleg | Black Scurf/Silver Scurf | Common Scab | Seed Piece Decay | Storage Rot | Verticillium Wilt | Canola (Rapeseed) | Cereals | Chickpeas | Corn | Field Beans | Flax | Forage Legumes | Grasses | Lentils | Mustard | Peas | Soybeans | Sunflowers | Triticale | Barley - Covered | Barley - False Loose | Corn - Head Smut | Oat - Smut | Rye - Bunt | Rye - Stem Smut | Wheat - Bunt/Common Smut | Barley - Loose Smut | Wheat - Loose Smut | Canola (Rapeseed) | Canola (Rapeseed) | Wireworms | Seed Corn Maggot | Flea Beetles | Root Maggots | Colorado Potato Beetle |
| Agrox B-2, Agrox CD | 261 |  |  |  |  |  |  |  |  |  | ● | ● |  |  |  |  |  | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  |
| Apron FL, Allegiance FL | 262 |  |  |  |  |  |  | ● | ● | ● | ● | ● |  | ● | ● | ● |  | ● | ● | ●[4] |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Apron Maxx RTA | 264 |  |  |  |  |  |  |  |  | ●[2] |  | ●[3] |  |  |  | ●[2] |  | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Baytan 30 | 265 |  |  |  |  |  |  |  | ●[1] |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  |  |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| Captan Flowable | 266 |  |  |  |  |  |  |  |  |  | ● | ● |  |  |  |  |  | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Charter | 267 |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  | ● |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| Crown | 268 |  |  |  |  |  |  |  |  | ●[2] |  |  |  |  |  | ●[2] |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cruiser 5FS, Cruiser 350FS | 270 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  |  |  |
| DB-Red L | 271 |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  | ● | ● |  | ● |  |  |  |  |  |  |  |  |  |
| DCT | 272 |  |  |  |  |  |  |  |  |  |  | ●[3] |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ● |  |
| Dividend XL RTA | 273 |  |  |  |  |  |  |  | ●[7] |  |  |  |  |  |  |  |  |  |  |  | ● | ● | ● |  | ● | ● |  | ● |  | ● |  |  |  |  |  |  |  |
| Foundation Lite | 275 |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  |  |  |  |  |
| Gaucho CS FL,<br>Gaucho 480 FL | 276 |  |  |  |  |  |  | ●[8] |  |  |  |  |  |  |  |  | ●[8] |  |  |  |  |  |  |  |  |  |  |  |  |  | ●[8] | ●[8] |  |  | ● |  |  |
| Gemini | 277 |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  | ● |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| Helix, Helix XTra | 279 |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  |  | ● |  |  |
| Imidacloprid-based Insecticides* (includes Genesis 240 and Admire SPT) | 280 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ●[5] |
| Mancozeb-based Fungicides* (includes Potato ST16, MancoPlus, Tuberseal) | 281 |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maxim 480FS | 282 |  |  |  |  |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maxim PSP* | 283 |  | ● |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mertect SC* | 284 |  | ● |  | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Polyram 16D* | 285 |  |  | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Prosper FL/Poncho 600<br>Poncho 600FS | 286 |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ●[6] | ●[6] | ●[6] |  |  |
| Raxil 250 FL | 287 |  |  |  |  |  |  |  | ●[1] |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  | ● |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| Raxil T | 289 |  |  |  |  |  |  |  | ●[7] |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  | ● |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| Senator PSPT* | 291 | ● | ● |  | ● |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Thiram 75WP | 292 |  |  |  |  |  |  |  |  |  | ● | ● |  | ● | ● |  | ● | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Vitaflo 280 | 293 |  |  |  |  |  |  |  | ●[7] |  | ● | ●[3] | ● |  |  | ● |  | ●[2] | ● |  | ● | ● | ● | ● | ● |  | ● | ● | ● | ● |  |  |  |  |  |  |  |
| Vitavax rs Fungicide | 295 |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  |  |  |  |  |
| Vitavax Single Solution | 296 |  |  |  |  |  |  |  | ● |  |  |  | ● |  |  |  |  |  |  |  |  | ● | ● |  | ● |  | ● | ● | ● | ● |  |  |  |  |  |  |  |

[1] wheat and barley only.
[2] also seed-borne ascochyta.
[3] also seed-borne anthracnose.
[4] also controls downy mildew.
[5] also controls flea beetle, potato leafhopper, and aphids.
[6] controlled only with Poncho products; includes corn insects.
[7] also controls seed-borne septoria.
[8] only controlled with Gaucho CS FL.

* Before using any pesticide on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

# Agrox B-2/Agrox CD

**Fungicide Group – M**
*(Refer to page 230)*

## Company:

Norac Concepts Inc.
(Agrox B-2 – PCP# 26956; Agrox CD – PCP# 26957)

## Formulation:

**Agrox B-2:** 33.5% captan, 11% diazinon.

**Agrox CD:** 15% captan, 15% diazinon.

Products formulated as wettable powders.

Container sizes: Agrox B-2 - 2.0 kg; Agrox CD - 0.6 kg

## Crops and Staging:

Corn, beans, soybeans, peas. Seed treatment.

## Diseases Controlled:

**Agrox B-2:** Seedling blight and seed rot.

**Agrox CD:** To supplement previous fungicide treatment for seedling blight and seed rot.

## Insects Controlled:

Seed corn maggot.

## Cost (2005 suggested retail prices):

**Agrox B-2:** $3.46 per 25 kg seed ($3.68 for corn); $13.84 per 100 kg seed ($14.72 for corn)

**Agrox CD:** $1.69 per 25 kg seed; $6.76 per 100 kg seed

## Rate:

**Agrox B-2:**
***Dry application:*** 320 g (340 g for corn) per 100 kg of seed.
***Slurry machines:*** adjust to apply 1240 mL (1260 mL for corn) of slurry per 100 kg of seed and use 250 g of seed treatment per L of water.
***Mixing in bucket (25 kg of seed):*** 84 g seed treatment per 500 mL of water per 25 kg of seed.

**Agrox CD:** 200 g per 100 kg of seed

## How it Works:

The active ingredient captan is a phthalimide fungicide with contact activity. The diazinon component is an organophosphate insecticide with contact and stomach activity.

## Registered Mixes:

Use Agrox CD only on seed previously treated with captan or thiram; do not use on seed already treated with an insecticide (other than methoxychlor or malathion). Do not use Agrox B-2 on seed already treated with an insecticide.

## Restrictions:

**Use:** Seed within one month of treatment.

**Storage:** Store in a cool, dry place. Treated seed must be labelled as follows: "Poisonous to man and animals. This seed has been treated with diazinon for the control of insects, and captan for disease control. Do not use for food or feed purposes. Do not sell to oil mills."

**Environment:** Do not contaminate food, feed, or any body of water.

**Resistance: Any insect or fungal population may contain individuals naturally resistance to Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate these products with insecticides/ fungicides with a different mode of action.**

## Precautions:

Keep out of reach of children. Do not mix with unprotected hands; use rubber gloves. Wash hands, face and arms thoroughly after handling. Do not breathe in mist or dust. When treating or handling treated seed, work in a well-ventilated area and wear a suitable respirator, goggles, clothing and gloves.

## Hazard Rating:

☠ Danger Poison

Warning, Agrox B-2 contains the allergen soy.

# Apron FL/Allegiance FL

**Fungicide Group – 4**
*(Refer to page 230)*

## Company:

Bayer CropScience
(Apron FL – PCP# 24262; Allegiance FL – PCP# 26674)

## Formulation:

317 g/L metalaxyl formulated as a liquid seed treatment. Container size: 3.79 L.

## Crops and Staging:

Alfalfa, beans, chickpeas, canola, clover, corn, grasses, low tannin lentils, peas, sainfoin, soybeans, sunflowers, and vetch. Crops for export only - wheat, barley, oats, rye, bird's-foot trefoil and sorghum.

Seed treatment.

## Diseases Controlled:

Seed rots and seedling blights caused by *Pythium* spp., early season *Phytophthora* of soybeans, and downy mildew of sunflowers. Also (for export purposes only) downy mildew of peas, corn, and sorghum.

## Cost (2005 suggested retail price):

$195.88 per L.

## Rates and Water Volumes:

Use the high rate if planting into cold, wet soils.

## Rates for crops processed in Canada:

| CROP | APRON FL or ALLEGIANCE FL (L per 100 kg seed treated) | WATER (L required to make up a total volume of 0.5 L) | KG SEED TREATED PER 3.79 L JUG |
|---|---|---|---|
| Chickpeas*, dry peas* | 0.016 - 0.11 | 0.484 - 0.39 | 23,625 - 3,436 |
| Canola (rapeseed)*, processing peas | 0.032 - 0.11 | 0.468 - 0.39 | 11,812 - 3,436 |
| Sainfoin, vetch, alfalfa, beans, clover, corn | 0.046 - 0.11 | 0.454 - 0.39 | 8,217 - 3,436 |
| Grasses (forage), soybeans | 0.046 - 0.093 | 0.454 - 0.407 | 8,217 - 4,064 |
| Grasses (turf) | 0.093 | 0.407 | 4,064 |
| Sunflowers (high rate is for downy mildew control) | 0.11 - 0.189 | 0.39 - 0.311 | 3,436 - 2,000 |
| Low tannin lentils | 0.016 | 0.484 | 23,625 |

*low rate provides good *Pythium* protection for 2 to 3 weeks.

## Rates for crops to be exported:

| CROP | APRON FL or ALLEGIANCE FL (L per 100 kg seed treated) | WATER (L required to make up a total volume of 0.5 - 0.62 L) | KG SEED TREATED PER JUG |
|---|---|---|---|
| Corn (downy mildew) | 0.189 - 0.62 | 0.311 - 0 | 2,000 - 609 |
| Peas (downy mildew) | 0.146 | 0.354 | 2,589 |
| Sunflowers (downy mildew) | 0.62 | 0 | 609 |
| Cereals (*Pythium*) | 0.046 - 0.11 | 0.454 - 0.39 | 8,217 - 3,436 |
| Sorghum (*Pythium*) | 0.093 - 0.11 | 0.407 - 0.39 | 4,064 - 3,436 |
| Sorghum (downy mildew) | 0.189 | 0.311 | 2,000 |
| Bird's-foot trefoil | 0.046 - 0.11 | 0.454 - 0.39 | 8,217 - 3,436 |

## Registered Mixes:

Compatible on the seed with the following products:

| | |
|---|---|
| Alfalfa, Peas | Thiram 75WP |
| Beans | Vitaflo 280 |
| Low tannin lentil | Crown |

## Application Information:

Apron FL and Allegiance FL should be mixed with water to form a slurry seed treatment. Apron FL and Allegiance FL contain no colourant. An appropriate colourant such as Prolzed Colourant must be added to slurry before treating seed.

When preparing the slurry the following procedure should be used:

1. Partially fill the mixing tank with water.
2. Add the required quantity of Apron FL or Allegiance FL onto the water surface.
3. Allow products to disperse and switch on agitation.
4. Top up with extra water to required volume and maintain agitation during use.
5. Add colourant last.

Treatment of highly mechanically damaged, poor quality or low vigour seed may result in reduced germination and/or reduced seed and seedling vigour. If seed lot quality is unknown conduct a germination test prior to treating.

## How it Works:

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity.

## Restrictions:

**Use:**

1. Treated seed must not be used for food, feed or oil processing.
2. Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure that treated seed is properly incorporated at planting.
3. Treated seed must be labelled as follows; **"This seed has been treated with Apron FL or Allegiance FL seed protectant which contains metalaxyl. Do not use for feed, food or oil processing."**

**Storage:** Do not store above 35°C or below 0°C. Store in original container, away from pesticides, food or feed. All bags containing seed for export must be labelled "FOR EXPORT ONLY."

**Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.

**Resistance: Experience has shown that strains of fungus resistant to metalaxyl may develop. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate Apron FL and Allegiance FL with fungicides with a different mode of action in your disease control program.**

## Hazard Rating:

Warning – Skin and eye irritant.

# Apron Maxx RTA

**Fungicide Group – 4, 12**
*(Refer to page 230)*

## Company:

Syngenta – PCP# 27577

## Formulation:

0.73% fludioxonil plus 1.10% metalaxyl-M formulated as a liquid seed treatment.

## Crops and Staging:

Chickpea, lentil, dry beans, dry peas, and soybeans. Seed treatment.

## Diseases Controlled:

| CROP | DISEASES CONTROLLED |
|---|---|
| Chickpea | Seedling blights (damping-off) and seed rots caused by *Pythium*, *Fusarium* and *Rhizoctonia* species.<br>Seed-borne ascochyta blight (*Ascochyta rabiei*)<br>Seed rot and seedling blight caused by seed-borne *Botrytis* spp. |
| Lentil | Seedling blights (damping-off) and seed rots caused by *Pythium*, *Fusarium* and *Rhizoctonia* species.<br>Seed-borne ascochyta blight (*Ascochyta lentis*)<br>Seed rot and seedling blight caused by seed-borne *Botrytis* spp. |
| Dry beans | Seedling blights (damping-off) and seed rots caused by *Pythium*, *Fusarium* and *Rhizoctonia* species.<br>Seed-borne anthracnose (*Colletotrichum* sp.) |
| Dry peas | Seedling blights (damping-off) and seed rots caused by *Pythium*, *Fusarium* and *Rhizoctonia* species. |
| Soybeans | Seedling blights (damping-off) and seed rots caused by *Pythium*, *Fusarium* and *Rhizoctonia* species.<br>Seed rot and seedling blight caused by seed-borne *Phomopsis* spp. |

## Cost (2005 suggested retail price):

$39.90 per L; $3.24 per 25 kg of seed

## Rate:

325 mL per 100 kg of seed

## Compatibility with Rhizobia-based Inoculants:

Apron Maxx RTA is compatible with Rhizobia-based inoculant. Check with inoculant manufacturer for details prior to use. Mixing with inoculants may increase drying time while treating. Recalibrate the seed drill before planting treated seed.

## Application Information:

Apron Maxx RTA is a ready-to-apply seed treatment formulation for use in commercial seed treatment plants and for on-farm treatment using standard gravity flow or mist type seed treatment equipment. Also used in treat-on-the-go air seeders. Ensure uniform coverage of the seed, as uneven seed coverage may not give the desired level of disease control. Treatment of highly damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. Allow the seed to dry before bagging, storing or seeding.

## How it Works:

Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including *Pythium* damping-off.

## Restrictions:

**Use:** All treated seed must be labelled **"This seed has been treated with fludioxonil and metalaxyl-M fungicides"**. Do not use for food, feed or oil purposes.

**Storage:** Store away from feeds and feedstuffs. Store between 0 and 30°C

**Environment:** This product is toxic to fish and other aquatic organisms. Do no apply directly to aquatic habitats and estuarine-marine habitats. Do not contaminate water by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up.

**Re-planting:** Do not plant any crop other than soybeans, dry beans, chickpea, lentils or dry peas within 30 days to fields in which treated seed was planted.

**Resistance:** Experience has shown that strains of fungus resistant to metalaxyl-M may develop. A gradual or total loss of pest control may occur over time if this active ingredient is used repeatedly in the same fields. Rotate Apron Maxx RTA with fungicides with a different mode of action in your disease control program.

## Precautions:

Keep out of reach of children. Harmful if swallowed. Avoid contact with eyes or prolonged contact with skin. Avoid inhalation of vapours or spray mist. When handling product, contaminated equipment or treated seed, wear long pants, a long-sleeved shirt and chemical resistant gloves. Wear a dust mask or respirator to minimize exposure to dust.

# Baytan 30

**Fungicide Group – 3**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 24677

## Formulation:

317 g/L triadimenol formulated as a liquid seed treatment. Container size: 3.78 L.

## Crops and Staging:

Wheat, barley. Seed treatment.

## Diseases Controlled:

**Wheat and Winter Wheat:** Loose smut, common bunt, powdery mildew (early season control), and suppression of take-all.

**Barley:** True loose smut, covered smut, false loose smut, leaf stripe, suppression of net blotch, scald and common root rot.

## Cost (2005 suggested retail price):

$12.40 to $24.80 per 100 kg seed

## Rates and Water Volumes:

**50 mL per 100 kg seed will control:**
Barley - smuts, leaf stripe and suppression of common root rot and scald
Spring wheat - smuts, powdery mildew
Winter wheat - smuts

**100 mL per 100 kg of seed will control:**
Barley - suppression of net blotch
Winter wheat - powdery mildew and suppression of take-all

| BAYTAN 30 (mL per 100 kg seed) | WATER REQUIRED (mL) | SLURRY RATE (mL) | KG SEED TREATED BY 10 L |
|---|---|---|---|
| 50 | 200 – 450 | 250 – 500 | 20,000 |
| 100 | 150 - 400 | 250 - 500 | 10,000 |

## Registered Mix:

Baytan 30 can be applied on seed treated with Vitaflo 280.

## Application Information:

Baytan 30 must be diluted with water prior to treatment of seed to ensure uniform distribution and coverage. The higher slurry rate is recommended for hulled barley varieties.

Seed treated with this product will sometimes emerge at a slower rate than untreated seed. Avoid late planting of treated winter wheat. Germination and seed vigour may also be reduced under adverse environmental conditions such as cool, wet soil or seed planted deeper than 4 cm.

Baytan 30 contains no colourant. An appropriate colourant such as ProIzed Colourant must be added before treating seed. No colourant is required if applying over seed treated with Vitaflo 280.

### How it Works:

The active ingredient triadimenol is a triazole fungicide with systemic activity.

### Restrictions:

**Use:** Treated seed must be labelled "This seed has been treated with Baytan 30 containing triadimenol. Do not use for feed, food or oil processing."

**Storage:** Do not store treated seed. Store product in original container only and away from other pesticides, fertilizer, food or feed. Keep container closed. Protect from freezing.

**Grazing:** Do not graze livestock on treated areas for 40 days after planting.

**Environment:** Do not contaminate ponds, lakes or streams.

**Resistance: Baytan 30 contains a triazole fungicide. Some loss of disease control may occur over time if Baytan 30 or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, due to the development of resistant strains of pathogens. Alternate use of Baytan 30 with fungicides with a different mode of action in your disease control program.**

### Precautions:

Keep out of reach of children. Do not get into eyes. Do not get onto skin. Avoid breathing vapours. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear a suitable dust mask, gloves and goggles.

### Hazard Rating:

Caution – Eye irritant; potential skin sensitizer.

## Captan Flowable

**Fungicide Group – M**
*(Refer to page 230)*

### Company:

Norac Concepts Inc. PCP# 12028

### Formulation:

30% captan formulated as a flowable seed treatment.

Container sizes: 20 L; 1000 L returnable container

### Crops and Staging:

Corn, beans, pea, soybean. Also registered for oat destined for export and not to be planted in Canada. Prior to storage or as a seed treatment.

### Diseases Controlled:

Storage rot, seed decay, root rot, damping off, seedling blight.

### Rates and Costs:

| CROP | CAPTAN FLOWABLE (mL per 100 kg seed) | COST PER 100 KG SEED (2005 suggested retail price) |
|---|---|---|
| Beans | 280 | $3.16 |
| Corn (field) | 120* - 200 | $1.36 to $2.24 |
| Pea | 280 | $3.16 |
| Soybean | 280 | $3.16 |
| Oat | 200 | $2.24 |

*At this rate product is to be applied only by a professional applicator using equipment which will assure complete and uniform coverage.

## Application Information:

Mix the recommended amount of Captan with the amount of water required for the slurry treater equipment to be used. Seed treated by the slurry method should not be bagged or stacked until it has dried.

## How it Works:

Captan is a phthalimide fungicide with protective activity.

## Restrictions:

**Storage:** Do not freeze. Product must be stored at ambient temperatures above 0°C and must not be stored with herbicides, feed, food or fertilizer. All treated seed must be labelled, "**Poisonous to man and animals. Do not use for food or feed. Do not sell to oil mills. This seed has been treated with Captan.**"

**Environment:** Do not contaminate food, feed, or any body of water.

**Resistance: Any fungal population may contain individuals naturally resistance to Group M fungicides. A gradual or total loss of pest control may occur over time if Group M fungicides are used repeatedly in the same fields. Rotate Captan Flowable with fungicides with a different mode of action.**

## Precautions:

Keep out of reach of children. Never handle material with bare hands. When treating, auguring or handling, work in a well-ventilated area and wear a respirator, goggles, rubber gloves and clothing that completely covers arms and legs. Wash hands, face and arms thoroughly after handling this product and before drinking, eating or smoking.

# Charter

**Fungicide Group – 3**
*(Refer to page 230)*

## Company:

BASF Canada PCP# 26455

## Formulation:

25 g/L triticonazole formulated as a liquid flowable seed treatment. Container size: 10 L (containing 3.1 L Charter); 200 L (containing 66.7 L Charter).

## Crops and Staging:

Wheat, barley and oats. Seed treatment.

## Rates and Diseases Controlled:

| CROP | CONCENTRATE USE RATE PER 100 KG SEED* | DISEASES CONTROLLED | DISEASES SUPPRESSED |
|---|---|---|---|
| Wheat | 100 mL | Seed rot caused by *Fusarium* spp.;<br>Seedling blight caused by seed-borne *Fusarium* spp.;<br>Loose smut; Common bunt | Fusarium crown and root rot;<br>Common root rot (caused by *Cochliobolus*) |
| Barley | 100 mL | Seed rot caused by *Fusarium* spp.;<br>Seedling blight caused by seed-borne *Fusarium* spp.; True loose smut;<br>Covered smut; False loose smut | Fusarium crown and root rot;<br>Common root rot (caused by *Cochliobolus*) |
| Oats | 100 mL | Loose smut; Covered smut | |

*Final volume of 300 mL diluted product per 100 kg of seed.

## Cost (2005 suggested retail price):

$6.32 per 100 kg of seed

## Application Information:

Charter is a concentrate seed treatment formulation for use in commercial seed plants, in on-farm standard gravity flow or mist type treatment machines, and in on-the-go air seeder treatment systems. Agitate or shake well prior to usage. Uneven seed coverage may result in poor levels of disease control. Seed should be well conditioned and cleaned before treating. Treated seed should not require drying after treatment.

**Water Volume:** Concentrate requires the addition of water. For best results, mix 2 parts water with 1 part Charter for wheat, barley and oats. Consult the seed treatment application equipment manufacturer for specific application instructions for use of various seed treatment application machines. When using the Flexi-Coil on-the-go Seed Treatment Unit, Charter should be diluted with 5 parts water (15.5 L) to 1 part Charter (3.1 L) to reach 60 mL per 10 kg of seed. One 40 L tank will hold 1 case (2 x 3.1 L jugs) in a 5:1 dilution.

## How it Works:

The active ingredient triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed and soil-borne diseases.

## Restrictions:

**Storage:** Store product in the original container. Keep container closed. Store in an area that is out of reach of children and animals, away from food, feedstuffs, fertilizer and seed. Protect from frost and freezing. Store treated seed under cool, dry conditions. Do not store treated seed for more than 18 months as it may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 6 months should be tested for germination before use. Treated seed should be labelled **"This seed has been treated with Charter, do not use for food, feed or oil processing"**

**Environment:** Do not feed or otherwise expose wildlife or birds to treated seed. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate domestic, irrigation or natural bodies of water.

**Resistance: Charter contains a triazole fungicide. Some loss of disease control may occur over time if Charter or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, because of the development of resistant strains of pathogens. Alternate use of Charter with fungicides with a different mode of action in your disease control program.**

## Precautions:

When handling Charter or treated seed wear chemical resistant gloves and coveralls. Avoid inhaling or breathing dust. Work in a well-ventilated area or wear a dust filtering respirator in non-ventilated areas. Wash hands and exposed skin thoroughly after handling the concentrate and after application.

## Hazard Rating:

☠ Caution Poison.

# Crown

**Fungicide Group – 1, 7**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 23430

## Formulation:

92 g/L carbathiin and 58 g/L thiabendazole, formulated as a liquid seed treatment. Container size: 10 L, 200 L, 1000 L.

## Crops and Staging:

Lentil and chickpea. Seed treatment.

## Diseases Controlled:

**Lentil:** Seed-borne ascochyta caused by *Ascochyta lentis*; Seed rots and post-emergence damping off caused by *Botrytis*, *Fusarium* and *Rhizoctonia* fungi.

**Chickpea:** Seed-borne ascochyta caused by *Ascochyta rabiei*.

## Cost (2005 suggested retail price):

$15.80 to $31.60 per 100 kg of seed

## Rates:

**Lentil:** 300 to 600 mL per 100 kg of seed. Use the higher rate to control seed-borne ascochyta.

**Chickpea:** 300 mL to 600 mL per 100 kg of seed. The lower rate will provide sufficient control of ascochyta in most cases. Use the higher rate for smaller seed size varieties.

## Compatibility with Rhizobia-based Inoculants:

Crown is compatible with Rhizobia and performs as a sticker for peat and granular inoculants. Crown and Rhizobia can be applied simultaneously to seed through separate systems or applied sequentially. Read inoculant label before use.

## Application Information:

**Commercial Treaters and On-Farm Auger Treating:**
Crown is a ready to use formulation designed for commercial treaters and on-farm auger treating. Crown is added directly to the seed as it enters a mixing chamber or auger. It is important that the seed and chemical be mixed quickly and uniformly. See instructions supplied with the applicable treater system for information on proper application techniques. When a grain auger is used for treating, running the auger less than full is the key to adequate mixing. Augers used for handling treated seed should not be used to move seed for food, feed or oil processing.

**Applications to Seed in a Hopper Box or Seed Drill:**
Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of Crown evenly over the seed surface. DO NOT pour in one area. Mix with a paddle until all seed is of a uniform red colour, indicating adequate coverage. DO NOT MIX WITH HANDS. Repeat this procedure until the hopper box or seed drill is filled. Seed can be planted immediately after treatment without drying. Stir Crown-treated seed rigorously if the seeding operation has been interrupted for several hours or overnight.

## How it Works:

The active ingredient carbathiin is a systemic fungicide and the active ingredient thiabendazole is a benzimidazole fungicide with both contact and systemic activity.

## Restrictions:

**Use:** Treated seed must be labelled "This seed has been treated with Crown seed protectant, which contains carbathiin and thiabendazole. Do not use for food, feed or oil processing."

**Storage:** Do not store product above 35°C or below 0°C or in direct sunlight. Store in original container only, away from other pesticides, fertilizers, food or feed. Mix product prior to use by shaking the 10 L container.

**Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.

**Environment:** Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure treated seed is properly incorporated at planting.

**Resistance:** Crown contains Group 1 and 7 fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate the use of Crown (and other Group 1 and 7 fungicides) with products with a different mode of action to prevent resistant pathogens populations from developing.

## Precautions:

When handling Crown or treated seed, work in a well-ventilated area; wear a long sleeved shirt, long pants, chemical resistant gloves and protective eyewear. Wash exposed skin after use.

## Hazard Rating:

Caution – Eye Irritant.

# Cruiser 5FS/Cruiser 350FS

**Contains insecticide only. Available to commercial seed treaters only.**

## Company:

Syngenta (Cruiser 5FS - PCP# 27045; Cruiser 350FS - PCP# 27986)

## Formulation:

**Cruiser 5FS:** 47.6% thiamethoxam.
**Cruiser 350FS:** 29.9% thiamethoxam.
**Container size:** 1000L, 1050L, Bulk

## Crops, Insects Controlled and Rates:

| CROPS: | INSECTS CONTROLLED: | RATE PER 100 KG OF SEED*: | |
|---|---|---|---|
| | | CRUISER 5FS | CRUISER 350 FS |
| Wheat;<br>Barley | Wireworms | 33 to 50 mL | 57 to 86 mL |
| Corn | Seed corn maggot | 83 to 166 mL | – |
| | Wireworms | – | 143 mL |
| Soybean | Seed corn maggot | – | 86 to 143 mL |
| | Wireworms | – | 143 mL |
| Dry bean | Potato leafhopper**;<br>Seed corn maggot | – | 86 to 143 mL |
| | Wireworms | – | 143 mL |

* Use the higher rate for fields that have a history of moderate to severe insect pressure.
**Use the higher rate to replace one application of a foliar insecticide spray.

## Cost:

Not available.

## Application Information:

For use only in commercial seed treatment facilities with closed transfer systems that provide uniform seed coverage. Cruiser 5FS contains no colourant. A red colourant must be added when Cruiser 5FS is applied to grain. Cruiser 350FS contains a colourant. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. Allow the seed to dry before bagging or storing in bulk containers.

## How it Works:

Thiamethoxam is a seed treatment insecticide in the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity.

## Registered Mixes:

For control of seed and soil-borne diseases, Cruiser 5FS can be mixed with fungicide seed treatments in a closed transfer system. Refer to label for details.

## Restrictions:

**Use:** Treated seed must not be used for food, feed or oil processing. All seed must be labelled **"Seed treated with thiamethoxam insecticide."**

**Storage:** Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. If product should freeze, bring to room temperature, then ensure the contents are mixed well prior to application.

**Grazing:** Do not graze or feed livestock on treated areas for 45 days after planting.

**Environment:** This product is toxic to fish and aquatic vertebrates. Do no apply directly to water or to areas where surface water is present. Do not contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. If treated seed is spilled outdoors or accessible to birds, promptly clean up or bury to prevent ingestion.

## Precautions:

Keep out of reach of children, unauthorized personnel and domestic animals. Harmful if swallowed, inhaled, or absorbed through skin. Do not get into eyes. Avoid prolonged contact with skin. Avoid inhalation of vapours, spray mist or treated seed dust. Treat seed in a well-ventilated area. Workers involved in treating, cleanup or maintenance of seed equipment must wear chemical-resistant coveralls over long sleeved shirt and long pants, chemical-resistant gloves, head gear and respiratory protection.

## Hazard Rating:

Caution Poison.

# DB-Red L

**Fungicide Group – M**
*(Refer to page 230)*

## Company:

Agsco Inc., distributed by United Agri Products – PCP# 27144

## Formulation:

323 g/L maneb. Container size: 2 x 10 L; 57 L returnable container

## Crops and Staging:

Wheat, barley, oats, rye. Seed treatment.

## Diseases Controlled and Rates:

| CROP | DISEASES CONTROLLED | RATE PER 100 KG SEED |
|---|---|---|
| Wheat | Common bunt<br>Root rot<br>Seedling blight (including *Fusarium*) | 312 mL |
| Barley | Covered smut<br>False loose smut<br>Root rot<br>Seedling blight | 396 mL |
| Oats | Covered smut<br>Root rot<br>Seedling blight | 552 mL |
| Rye | Common bunt<br>Root rot<br>Seedling blight | 260 mL |

## Cost (2005 suggested retail prices):

**Wheat:** $5.85 per 100 kg seed
**Barley:** $7.43 per 100 kg seed
**Oats:** $10.36 per 100 kg seed
**Rye:** $4.88 per 100 kg seed

## How it Works:

The ingredient maneb is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Use only recommended rates; lower amounts may not give the desired control and higher amounts may cause seed injury. Uneven treating of seed may cause over-treatment of some seed and under-treatment on other seed. Seed should be well-cured, dry and cleaned before treatment.

**Storage:** Store away from heat source and in a cool, dry area. If product becomes frozen, thaw and shake or agitate. If treated seed is stored, label container, **"This seed has been treated with DB-Red L seed treatment. Do not use for food, feed or processing."** Excess treated seed should not be stored past planting time. Do not contaminate feed or food stuffs.

**Grazing:** Do not graze or feed livestock on treated areas.

**Environment:** Do not contaminate ponds, lakes or streams.

## Hazard Rating:

Danger Poison

# DCT

**Fungicide Group – 1, M**
*(Refer to page 230)*

## Company:

Norac Concepts Inc. PCP# 14986

## Formulation:

6% diazinon, 18% captan, and 14% thiophanate-methyl formulated as a seed treatment powder. Container size: 10 kg.

## Crops and Staging:

Field beans. Seed treatment.

## Diseases Controlled:

Seedling blight, root rot, seed-borne anthracnose. This product will not control anthracnose if seed is severely infected.

## Insects Controlled:

Root maggots.

## Cost (2005 suggested retail price):

$16.40 per 100 kg of seed

## Rates:

For slurry machines: 520 g per 1 L water. Use 1 L of slurry per 100 kg of seed.

For mixing in bucket: 130 g per 0.35 L water. Use 0.35 L of slurry per 25 kg of seed.

## How it Works:

The active ingredient captan is a phthalimide fungicide with protective activity. The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity. The diazinon component is an organophosphate insecticide with contact and stomach activity.

## Restrictions:

**Storage:** Do not store treated seed for more than one month. Treated seed should be coloured and labelled **"Poisonous to man and animals. This seed has been treated with diazinon, captan and thiophanate-methyl for control of insects and seed-borne diseases. Do not use for food or feed purposes."**

**Environment:** Do not contaminate any body of water.

**Resistance: DCT contains Group M and Group 1 fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Where possible, rotate the use of DCT (or other fungicides in this class) with different fungicides that control the same pathogens.**

## Precautions:

May be fatal if swallowed. Never handle material with bare hands. Do not breathe dust. When treating, auguring, or handling, work in a well-ventilated area and wear a respirator, goggles, rubber gloves and clothing that completely covers arms and legs.

## Hazard Rating:

☠ Danger Poison

Warning - contains the allergen soy.

# Dividend XL RTA

**Fungicide Group – 3, 4**
*(Refer to page 230)*

## Company:

Syngenta PCP# 25777

## Formulation:

3.37% difenoconazole, 0.27% metalaxyl-M formulated as a flowable seed treatment.

Container size: 2 x 10 L jugs; 115 L returnable tote.

## Crops and Staging:

Spring Wheat, Durum, Winter Wheat and Barley.
Seed treatment.

## Rates and Diseases Controlled:

| CROP | USE RATE PER 100 KG SEED[1] | DISEASES CONTROLLED | DISEASES SUPPRESSED[2] |
|---|---|---|---|
| Barley | 325-650 mL | General seed rots[2] ; Seedling blight caused by seed- and soil-borne *Fusarium; Pythium* and *Fusarium* Damping-off; Seed-borne *Septoria*[3]; False Loose Smut; Covered Smut | Common Root Rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; Take-all |
| Corn | 325-650 mL | General seed rots[2]; Seedling blight caused by seed- and soil-borne *Fusarium; Pythium* Damping-off | |
| Corn | 325 mL | Penicillium three leaf dieback | |
| Oats | 325-650 mL | General seed rots[2]; Seedling blight caused by seed- and soil-borne *Fusarium; Pythium* Damping-off; Covered Smut; Loose Smut | Common Root Rot (*Cochliobolus* spp.) |
| Rye | 325-650 mL | General seed rots[2]; Seedling blight caused by seed- and soil-borne *Fusarium; Pythium* Damping-off; Seed-borne *Septoria*[3]; Common Bunt[6], Dwarf Bunt[6] | Common Root Rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; Take-all |
| Triticale | 325-650 mL | General seed rots[2]; *Pythium* Damping-off; Loose Smut | Common Root Rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; Take-all |
| Spring Wheat | 325-650 mL | General seed rots[2]; Seedling blight caused by seed- and soil-borne *Fusarium; Pythium* and *Fusarium* Damping-off; Seed-borne *Septoria*[3]; Common Bunt[6], Loose Smut | Common Root Rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; Take-all |

See footnotes on following page.

| CROP | USE RATE PER 100 KG SEED[1] | DISEASES CONTROLLED | DISEASES SUPPRESSED[4] |
|---|---|---|---|
| Winter Wheat | 325-650 mL | General seed rots[2]; Seedling blight caused by seed- and soil-borne *Fusarium; Pythium* and *Fusarium* Damping-off; Seed-borne *Septoria*[3]; *Septoria* Leaf Blotch[3,5]; Common Bunt[6]; Dwarf Bunt[6]; Loose Smut | Common Root Rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; Take-all |

[1] Use the higher rate where conditions favour seed- or soil-borne pathogens.

[2] General seed rots controlled include those caused by saprophytic organisms such as *Penicillium, Aspergillus, Fusarium,* and *Pythium*. Use the 325 mL rate for control of these diseases.

[3] Use the 650 mL rate for control of these diseases.

[4] Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

[5] Early season foliar disease control for first 4 weeks after planting. For full season control apply a foliar fungicide according to label directions.

[6] Dividend XL RTA controls both seed and soil-borne bunts (common, dwarf).

## Cost (2005 suggested retail price):

$25.25 per L; $2.05 to $4.10 per 25 kg of seed ($8.20 to $16.40 per 100 kg of seed)

## Application Information:

Dividend XL RTA is a ready-to-apply formulation for use in commercial seed treatment plants, and for on-farm treatment using standard gravity flow or mist-type seed treatment equipment which accurately meters and mixes a flowable seed treatment. Dividend XL RTA may also be used in a treat-on-the-go air seeder. The equipment must provide uniform coverage of Dividend XL RTA on the seed. Uneven seed coverage may not give the desired level of disease control.

Consult the manufacturer of the application equipment for suitability for this application and for instructions on operation and calibration of the equipment.

**Water Volume:** Dividend XL RTA does not require addition of water for application. However, when using the Flexi-Coil Seed Treatment Unit, Dividend XL RTA must be diluted with water to reach 99 mL/10 kg of seed. The recommended dilution rate is 1 part Dividend XL RTA to 2 parts water. This is equal to 33 ml of Dividend plus 66 ml of water in order to achieve the total liquid volume requirement of 99 ml/10 kg seed.

## How it Works:

The active ingredient difenoconazole is a systemic fungicide from the triazole fungicide class that provides broad-spectrum protection against seed and soil-borne diseases. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including *Pythium* damping-off.

## Registered Mixes:

For the control of true loose smut (*Ustilago nuda*) in barley, tank mix Dividend XL RTA with Charter, Raxil 250FL or Baytan 30. Read the label directions for each product and follow the more restrictive label precautions and limitations.

## Restrictions:

**Use:** Treated seed should be labelled **"This seed has been treated with Dividend XL RTA; do NOT use for food, feed, or oil purposes."**

**Storage:** Keep in heated storage. Product will freeze at -18°C. Store away from feeds and food stuffs.

**Grazing:** Do not graze, feed green forage or cut for hay within 35 days of planting treated cereal grain seeds.

**Re-cropping:** Do not plant any crop other than cereal grains listed on this label within 30 days to fields in which treated seeds were planted.

**Environment:** Do not apply directly to water or to areas where surface water is present. Do not contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

**Resistance: Dividend XL RTA contains a triazole fungicide. Some loss of disease control may occur over time if Dividend XL RTA or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, due to the development of resistant strains of pathogens. Alternate use of Dividend XL RTA with fungicides with a different mode of action in your disease control program.**

## Precautions:

Keep out of reach of children. When handling Dividend XL RTA, contaminated equipment or seed treated with Dividend XL RTA, wear long pants, a long-sleeved shirt and chemical resistant gloves. In addition, wear a suitable dust mask when bagging or sewing bags of treated seed or when transferring seed to a storage bin.

## Hazard Rating:

None.

# Foundation Lite

**Fungicide Group – 2, M**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 25592

## Formulation:

132 g/L iprodione and 88 g/L thiram.

Container size: 100 L, 200 L, 1000 L.

## Crop and Staging:

Canola, mustard. Seed treatment.

## Diseases Controlled:

Damping off and root rot caused by *Rhizoctonia solani*, seed-borne blackleg and seed-borne *Alternaria* black spot.

## Cost (2005 suggested retail price):

$77.68 per 100 kg of seed

## Rate:

2252 mL per 100 kg seed; 100 L container treats 4,444 kg of seed

## Application Information:

Roll drum or stir well before using. Foundation Lite treated seed should not require drying after treatment and can be stored or bagged immediately. Add product to seed slowly and mix well for 3-5 minutes in treating equipment. Thorough seed coverage is required.

## How it Works:

The active ingredient iprodione is a dicarboximide fungicide with contact and eradicant activity. The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed must be labelled **"This seed has been treated with Foundation Lite containing iprodione and thiram. Do not use for feed, food or oil processing."** Date of treatment must also be included.

**Storage:** Protect product from frost. Store treated seed in cool dry conditions. Do not store treated seed for more than 6 months. Treated seed stored for periods in excess of 6 months may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 6 months should be tested for germination before planting.

**Environment:** Do not contaminate domestic or irrigation waters. Do not contaminate feed or food stuffs.

## Precautions:

Keep out of reach of children; avoid contact with skin and eyes. When handling product or treated seed work in a well-ventilated area, wear chemical resistant gloves, coveralls and wear a suitable respirator. Do not consume alcoholic beverages 24 hours before or after working with Foundation Lite.

## Hazard Rating:

Caution Poison

Caution - Eye and skin irritant.

# Gaucho CS FL/ Gaucho 480 FL

**Fungicide Group – 7, M**
*(Refer to page 230)*

**Gaucho CS FL and Gaucho 480 FL are available to commercial seed treaters only.**

## Company:

Bayer CropScience (Gaucho CS FL – PCP# 27174; Gaucho 480 FL – PCP# 26124)

## Crops and Staging:

Canola, rapeseed and mustard. Seed treatment.

## Formulation:

**Gaucho CS FL:** 285.7 g/L imidacloprid; 47.6 g/L carbathiin; 95.3 g/L thiram.

**Gaucho 480 FL:** 480 g/L imidacloprid.

Container sizes: 10, 100, 1000 L.

## Rates, Insects and Diseases Controlled:

| PRODUCT | RATE (ML) PER 100 KG SEED[2] | INSECTS CONTROLLED[3] | DISEASES CONTROLLED |
|---|---|---|---|
| **Gaucho CS FL[1]:** | 1400 - 2100 | Early season control of flea beetles. | Seed rot, damping off, seedling blight and early season root rot caused by *Rhizoctonia, Pythium* and *Alternaria* spp.;<br>Seed-borne blackleg (*Leptosphaeria maculans*)[4] |
| **Gaucho 480 FL:** | 833 - 1667 | Early season control of flea beetles. | — |

[1] For areas where flea beetle populations are often high, tank mix Gaucho CS FL with Gaucho 480 FL according to label directions.

[2] In areas where flea beetle populations are often high, use the higher rates.

[3] Under high insect pressure, a foliar insecticide may be required, therefore monitor crop regularly for insect infestation levels.

[4] In canola and rapeseed only.

## Cost:

Not available.

## Application Information:

For use in commercial seed treaters only. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. Keep above 10°C prior to and during application. Do not apply direct heat to container. These products do not contain colourant. A blue colourant must be added when products are applied to oilseeds. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

## How it Works:

Imidacloprid is a chloronicotinyl insecticide with systemic activity. The active ingredient carbathiin is a carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed must be labelled as follows: **"This seed has been treated with imidacloprid and/or carbathiin and thiram. Do not use for food, feed or oil processing. Store away from feeds and other foodstuffs."**

**Storage:** Protect products from freezing. Do not store Gaucho 480 FL in direct sunlight or above 35°C. Treated seed stored for periods in excess of 9 months should be tested for germination before planting. Do not store treated seed above 25°C or in direct sunlight.

**Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.

**Environment:** These products are highly toxic to birds and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment wash water. Cover or incorporate spilled treated seeds. Leftover treated seed should be double sown around the headlands, or buried away from water sources.

## Precautions:

Keep out of reach of children. Harmful if swallowed, absorbed through skin or inhaled. When handling Gaucho products or treated seed, work in a well-ventilated area and wear chemical resistant gloves, protective eyewear and a suitable mask.

## Hazard Rating:

Caution Poison

# Gemini

Fungicide Group – 3, M
*(Refer to page 230)*

## Company:

BASF Canada Inc. PCP# 27826)

## Crops and Staging:

Wheat, barley and oats. Seed treatment.

## Formulation:

1.25% triticonazole and 12.5% thiram formulated as a liquid flowable seed treatment. Container size: 2 x 6 L; 200 L.

## Rates and Diseases Controlled:

| CROP | USE RATE PER 100 KG SEED | DISEASES CONTROLLED | DISEASES SUPPRESSED |
|---|---|---|---|
| **Wheat** | 360 mL | Seed rot caused by *Fusarium* spp.; Seedling blights caused by seed and soil-borne *Fusarium* spp.; Loose smut; Common Bunt; *Pythium* Damping off | *Fusarium* crown and Root rot; Seedling blight and Common root rot caused by *Cochliobolus* sp. |
| **Barley** | 360 mL | Seed rot caused by *Fusarium* spp.; Seedling blights caused by seed and soil-borne *Fusarium* spp.; True loose smut; Covered smut; False loose smut; *Pythium* damping off | *Fusarium* crown and Root rot; Seedling blight and Common root rot caused by *Cochliobolus* sp. |
| **Oats** | 360 mL | Loose smut<br>Covered smut | |

## Cost: (2005 suggested retail price)

$7.12 per 100 kg of seed

## Application Information:

Gemini is a ready-to-use seed treatment for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. Gemini can also be used in on-the-go air seeder treatment systems. Agitate or shake well prior to usage.

**Water volume:** Gemini does not require the addition of water for application. When using the Flexi-Coil on-the-go Seed Treatment Unit, Gemini should be diluted with water to reach 108 mL per 10 kg of seed. The recommended dilution rate is 1 part Gemini to 2 parts water, which equals 36 mL of Gemini plus 72 mL of water in order to achieve a total volume of 108 mL per 10 kg of seed.

## How it Works:

The active ingredient triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed and soil-borne diseases. Thiram is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed must be labelled "This seed is treated with Gemini seed treatment containing triticonazole and thiram. Do not use for food, feed or oil processing". Do not store treated seed for more than 18 months. Store treated seed in cool, dry conditions.

**Storage:** Store product in original container with the li tightly closed. Store in an area that is out of reach of childre and animals, away from food, feed stuffs, fertilizers an seed. Protect from frost and freezing.

**Environment:** Do not feed treated seed to, or otherwis expose, wildlife or domestic birds. Do not contaminat domestic or irrigation water supplies, lakes, streams, pond or any body of water with the chemical, used containers treated seed or bags. Do not contaminate water by cleanin of equipment or disposal of wastes.

**Resistance: Any fungal population may contain individuals naturally resistant to Gemini and other Group 3 and Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate the use of Gemini or other Group 3 and M fungicides with different groups that control the same pathogens.**

## Precautions:

Keep out of reach of children. Avoid contact with skin eyes or clothing. Wear chemical resistant gloves, chemica resistant coveralls and a NIOSH approved dust filterin respirator when handling the product or treated seed Work in a well-ventilated area. Wash hands and expose skin thoroughly after handling the concentrate and afte application.

## Hazard Rating:

Caution Poison.

# Genesis 240/Admire SPT

See Imidacloprid-based Insecticide Potato Seed Treatments on page 280.

# Helix/Helix XTra

**Fungicide Group – 3, 4, 12**
*(Refer to page 230)*

**Helix and Helix XTra are available to commercial seed treaters only.**

## Company:

Syngenta (Helix – PCP# 26637; Helix XTra – PCP# 26638)

## Formulation:

**Helix:** 10.3% thiamethoxam, 1.24% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil.

**Helix XTra:** 20.7% thiamethoxam, 1.25% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil.

Formulated as a liquid seed treatment.
Container size: 1000 L returnable tote

## Crops and Staging:

Canola, mustard. Seed treatment.

## Diseases Controlled:

Seed-borne blackleg, seed-borne *Alternaria*, and the seedling disease complex (damping off, seedling blight, seed rot, root rot) caused by *Pythium*, *Fusarium* and *Rhizoctonia* spp.

## Insects Controlled:

Early season control of flea beetles.

**Helix:** 14 to 21 days

**Helix XTra:** 28 to 35 days

## Cost:

Not available.

## Rate:

1.5 L per 100 kg seed (375 mL per 25 kg seed).

## Application Information:

For use only in commercial seed treatment facilities with closed transfer systems. Helix and Helix XTra are ready to use liquid products and contain an appropriate colourant. Apply using standard commercial seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of insect or disease control. Consult the manufacturer of the seed treating equipment for advice on the operation and calibration of the equipment. Maintain constant agitation during the seed treatment process. Allow the seed to dry before bagging.

## How it Works:

The active ingredient thiamethoxam is a systemic insecticide from the neonicotinoid chemical class. The active ingredient difenoconazole is a systemic fungicide from the triazole chemical class that provides broad-spectrum protection against seed and soil-borne diseases. The active ingredient metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including *Pythium* damping off. The active ingredient fludioxonil is a phenylpyrrole chemistry and has contact and local penetrant properties.

## Restrictions:

Use: All treated seed must be labelled **"This seed has been treated with Helix which contains insecticide (thiamethoxam) and fungicides (difenoconazole, metalaxyl-M and fludioxonil). Wear long-sleeve shirt, long pants, and chemical resistant-gloves when handling treated seed. Do not use for food, feed or oil processing. Store away from food and feed."**

**Storage:** Store in a well-ventilated, secure area.

**Environment:** Do not apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, do not contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes.

## Precautions:

Keep out of reach of children. Treat seed in a well-ventilated area. All seed treaters and handlers must wear chemical-resistant coveralls over long sleeve shirt and long pants, chemical-resistant gloves, head gear, and respiratory protection (i.e. half-mask respirator with suitable dust filter or fresh air hood).

## Hazard Rating:

Caution Poison

# Imidacloprid-based Insecticide Potato Seed Treatments

**Includes Admire SPT and Genesis 240. Contain insecticide only.**

## Company:

Bayer CropScience
(Admire SPT – PCP# 27702; Genesis 240 – PCP# 27349)

## Formulation:

240 g/L imidacloprid. Container size: 1 L, 3.78 L

## Crops and Staging:

Potato. Seed treatment.

## Insects Controlled:

Control of Colorado potato beetle, potato flea beetle, potato leafhopper and aphids (including green peach, buckthorn, foxglove and potato aphid).

## Cost (2005 suggested retail price):

**Genesis 240:** $6.72 to $10.09 per 100 kg of potato seed tubers

**Admire SPT:** not available

## Rate:

26 to 39 ml per 100 kg of potato seed tubers. The higher rate is recommended when extended length of control is needed.

## Application Information:

May be applied when potato pieces are being cut. Apply specified dosage as a diluted spray onto seed-pieces using a shielded spray system that is well contained and will prevent the loss of any liquid. Do not dilute with any more than 3 parts water to 1 part Genesis 240 or Admire SPT Insecticide. Agitate or stir spray solution as needed. Complete coverage of the seed piece is required for optimal insect control. As part of the seed cutting and treating process, application of a fungicide registered for potato seed treatment or an inert absorbent ingredient is recommended.

## How it Works:

Imidacloprid is a chloronicotinyl insecticide with systemic activity.

## Restrictions:

**Use:** Do not apply more than 0.47 L per acre per year. Plant seed pieces as soon as possible after cutting and treating. Avoid prolonged exposure of treated seed to sunlight. Do not use treated seed pieces for food, feed or fodder.

**Storage:** Store product in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children.

**Re-planting:** Use a minimum plant-back interval of 30 days for cereals, 9 months for peas and beans, and 12 months for all other food and feed crops. Green manure and other cover crops not intended for human or animal consumption do not require a plant-back interval following treatment. Do not graze or harvest cover crops for food or feed. It is not recommended that this product be used in fields treated with imidacloprid during the previous season.

**Environment:** Do not plant treated seed pieces when rainfall is forecast for next 48 hours. Do not plant treated seed pieces within 15 metres of well-head or aquatic systems, including marshes, ponds, ditches, streams, lakes, etc. This product is toxic to wildlife. Keep out of lakes, streams, ponds, or other aquatic systems. Do not contaminate water when disposing of equipment wash waters. Leftover treated seed should be double sown around the headland, or buried away from water sources such as lakes, streams, ponds or other aquatic systems.

## Precautions:

Keep out of reach of children. Harmful if swallowed or absorbed through skin. Applicators and other handlers must wear long-sleeved shirt and long pants, water-proof gloves and shoes plus socks. Apply only in areas with adequate ventilation or in areas that are equipped to remove spray mist.

## Hazard Rating:

Caution Poison

# Mancozeb-based Fungicides

**Fungicide Group – M**
*(Refer to page 230)*

**Includes Potato ST 16, MancoPlus, and Tuberseal**

## Company:

Norac Concepts Inc. (MancoPlus – PCP# 26157; Tuberseal – PCP# 17042)

United Agri Products (Potato ST 16 – PCP# 24734)

## Formulations:

16% mancozeb formulated as a dust. Container size: 10 kg (MancoPlus; Tuberseal); 20 kg (Potato ST 16).

## Crops and Staging:

Potatoes. Seed treatment

## Diseases Controlled:

*Fusarium* seed piece decay in potatoes.

## Cost (2005 suggested retail prices):

Per 100 kg of seed: $2.20 (MancoPlus); $2.53 (Potato ST 16); $2.40 (Tuberseal)

## Rates:

500 g per 100 kg seed.

## Application Information:

Apply product before planting. If treated whole seed is cut, make a second application to protect cut surfaces. Plant as soon as possible after treating. If cut seed is not planted immediately, store in a ventilated location to allow cut surfaces to dry.

## How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed pieces should be labelled **"Poisonous to man and animals. This seed has been treated with mancozeb for control of *Fusarium* decay. Do not use for food or feed."**

**Storage:** Store product in a cool, dry, well-ventilated place. Keep away from fire and sparks.

**Environment:** Do not contaminate feed or food. Do not contaminate any body of water.

**Resistance:** Any fungal population may contain individuals naturally resistance to Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate these products with fungicides with a different mode of action.

## Precautions:

Keep out of reach of children. May be harmful if swallowed or inhaled. May cause irritation of eyes, nose, throat and skin. Wash thoroughly after handling and before eating, drinking or smoking. When treating or handling treated seed, work in a well-ventilated area and wear a suitable dust mask, goggles and gloves.

# Maxim 480FS

**Fungicide Group – 12**
*(Refer to page 230)*

**This product is available to commercial seed treaters only.**

## Company:

Syngenta PCP # 27001

## Formulation:

40.3% fludioxonil, as a water-based slurry.
Container size: 55 L.

## Crops and Diseases Controlled

Seed treatment.

| CROPS: | DISEASES CONTROLLED: |
|---|---|
| **Cereals:** Barley, corn, buckwheat, millet, oats, rye, triticale, wild rice, wheat. | Seed- and soil-borne diseases caused by *Fusarium* spp. (including *F. graminearum*) and *Rhizoctonia* spp. |
| **Legumes:** Bean, pea, soybean, chickpea, lentil. | Seed- and soil-borne diseases caused by *Fusarium* spp. (including *F. graminearum*) and *Rhizoctonia* spp.<br>Seedling diseases due to *Aspergillus* and *Penicillium* spp. in soybean<br>Seed rot and seedling blight caused by seed-borne *Phomopsis* spp. in soybean |
| **Oilseeds:** Flax, canola, mustard, rapeseed, safflower, sunflower. | Seed- and soil-borne diseases caused by *Fusarium* spp. (including *F. graminearum*) and *Rhizoctonia* spp.<br>Seedling diseases due to *Aspergillus* and *Penicillium* spp. on canola and mustard. |
| **Herbs and Spices:** Anise, borage, caraway, coriander, dill, others. | Seed- and soil-borne diseases caused by *Fusarium* spp. (including *F. graminearum*) and *Rhizoctonia* spp. |
| **Grasses:** All grasses including turfgrass,bermudagrass, bluegrass, fescue, bromegrass. All pasture and grasses grown for hay or silage. | Seed- and soil-borne diseases caused by *Fusarium* spp. (including *F. graminearum*) and *Rhizoctonia* spp. |
| **Non-grass Forages:** Alfalfa, clover, sainfoin, trefoil, vetch, others | Seed decay and damping off caused by *Fusarium avenaceum* |

## Rates:

5.2 to 10.4 mL to treat 100 kg of seed. Use the higher rate for crops that are expected to be more susceptible to pathogens or when high disease pressure is expected.

## Cost:

Not available.

## Application Information:

For use by commercial seed treaters only. This product contains no colorant. An appropriate colourant must be added when this product is applied. Shake or mix well before using. Use standard slurry seed treatment equipment which provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Thoroughly mix the recommended amount of product into the required amount of water for the slurry treater and dilution rate to be used. Follow the manufacturer's application instructions for the seed treatment equipment being used. Maintain constant agitation of slurry during treatment. Allow the seed to dry before bagging.

## How it Works:

The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity.

## Registered Mixes:

Maxim 480FS will not control seed rots or blights caused by *Pythium* or *Phytophthora* species and can be mixed with a labelled seed treatment product with activity against these diseases. Consult each label for registered use rates and instructions.

## Restrictions:

**Use:** All treated seed must be labelled **"This seed has been treated with fludioxonil fungicide. Do not use for food, feed, or oil purposes. Store away from feed and foodstuffs. Do not graze treated crops, or cut for forage within 30 days of planting."**

**Storage:** Store above freezing and below 30°C.

**Environment:** This product is toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. In cleaning of equipment or disposing of wastes, do not contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes.

**Resistance: Maxim 480FS contains a Group 12 fungicide. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Alternate the use of Maxim 480FS (and other Group 12 fungicides) with products with a different mode of action.**

## Precautions:

Keep out of reach of children. May be harmful if swallowed. Avoid inhalation of vapour, spray mist or treated seed dust. Treat seed in a well-ventilated area. When handling product or seed, wear long-sleeved coveralls and chemical-resistant gloves. When bagging or sewing bags of treated seed, wear a dust mask.

# Maxim PSP

**Fungicide Group – 12**
*(Refer to page 230)*

## Company:

Syngenta PCP# 26647

## Formulation:

0.5% fludioxonil formulated as a dry powder.
Container size: 10kg

## Crops and Staging:

Potatoes. Seed piece treatment.

## Diseases Controlled:

Black scurf (*Rhizoctonia solani*), silver scurf (*Helminthosporium solani*), and fusarium dry rot (*Fusarium* spp.)

## Cost (2005 suggested retail price):

$5.85 per 100 kg of cut seed.

## Rate:

Use 500 g per 100 kg of cut seed. One 10 kg bag treats 2000 kg of seed.

## Application Information:

Apply using appropriate treater designed for treating potatoes or by dust attachment over belt. Cut pieces should be treated immediately after cutting. If treated seed pieces are bagged, they should be stored for 2-3 days in open crates before bagging. For optimum protection against silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential.

## How it Works:

The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity.

## Restrictions:

**Storage:** Store in a dry place. Avoid contamination of feed and foodstuffs.

**Environment:** Do not contaminate domestic or irrigation water supplies, lakes, streams and ponds.

**Resistance:** Any fungal population may contain individuals naturally resistant to fludioxonil or strains of some fungi may develop tolerance to fungicides after prolonged use. It is important to follow label rate and directions and to observe all practices that minimize occurrence of resistance. Whenever possible, alternate with products from different chemical families. In order to minimize the potential for the development of resistance among labelled disease organisms do not use Maxim PSP in any two consecutive seed generations.

### Precautions:

Avoid inhalation of dust. Wear two layers of clothing, work boots, mask, and chemical-resistant gloves when handling product and treated seed. Wash hands and face after handling. May be harmful if swallowed. Keep out of reach of children.

### Hazard Rating:

Caution Poison

## Mertect SC

**Fungicide Group – 1**
*(Refer to page 230)*

### Company:

Syngenta PCP# 13975

### Formulation:

500 g/L thiabendazole formulated as a water dispersible suspension. Container size: 4 x 5 L.

### Crops and Staging:

Potato. Post-harvest treatment.

### Diseases Controlled:

Fusarium dry rot (*Fusarium* spp.), skin spot, silver scurf (*Helminthosporium* spp.), black scurf (*Rhizoctonia* spp.), and pocket rot (*Phoma* spp.)

### Cost (2005 suggested retail price):

$80.69 per L

### Rate and Water Volume:

7.5 L per 170 L of water. Spray 2 L of this suspension per 1 metric tonne of potatoes.

### Application Information:

Shake well before using. Do not allow suspension to stand without continuous agitation. Potatoes must rotate along conveyor line to ensure complete coverage. Prior to treating potatoes destined for export, confirm with authorities that treated potatoes will be allowed to enter importing country.

### How it Works:

The active ingredient thiabendazole is a benzimidazole fungicide with systemic activity.

### Restrictions:

**Storage:** Minimum storage temperature 0°C.

**Resistance:** Thiabendazole-resistant strains of silver scurf and fusarium dry rot can develop.

Strains of some fungi may develop tolerance to Mertect SC or other products in the same class of chemistry after prolonged usage. When using Mertect SC, use full rates and ensure thorough coverage. If potatoes are going to be treated with Mertect SC prior to storage in the fall, do not use any product containing thiophanate-methyl at planting. Do not use any product containing thiophanate- methyl if Mertect SC was used as the storage treatment on seed. Use seed treatment with a different mode of action on Mertect SC treated seed potatoes.

### Precautions:

Wear chemical-resistant gloves when handling product. May cause eye irritation. Avoid contact with eyes, skin and clothing. Keep out of reach of children. Harmful if swallowed.

# Polyram 16D

**Fungicide Group – M**
*(Refer to page 230)*

## Company:

BASF Canada PCP# 25867

## Formulation:

16% metiram formulated as dust. Container size: 10 kg.

## Crops and Staging:

Potatoes. Seed treatment.

## Diseases Controlled:

*Fusarium* seed piece decay; seed-borne common scab (*Streptomyces* spp.)

## Cost (2005 suggested retail price):

$53.77 per 10 kg bag; $2.42 to $3.50 per 100 kg cut seed

## Rates:

450 to 650 g per 100 kg seed. One container treats 2,222 to 1,538 kg of seed.

## How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity.

## Application Information:

Apply to entire surface of seed pieces after cutting. Treated potato seed should not be allowed to stand in hot sun or drying wind. Seed should not be planted into hot, dry soil or in cold, wet soil. Plant as soon as possible after treating. If not planted immediately, provide sufficient ventilation to allow cut surface to dry. If not cutting seed, treat at same rate for control of seed-borne common scab, apply a second application to control fusarium seed piece decay.

## Restrictions:

**Storage:** Store product in cool, dry, locked, well-ventilated area without floor drain. Keep away from heat, fire or sparks. Do not allow product to become wet or overheated as this will reduce its effectiveness and may create flammable vapours. Protect from freezing. Do not ship or store near food, feed, seed or fertilizers.

**Environment:** Do not contaminate domestic or irrigation water, lakes, streams or ponds by the cleaning of equipment or the disposal of wastes.

**Resistance: Any fungal population may contain individuals naturally resistance to Group M fungicides. A gradual or total loss of pest control may occur over time if Polyram 16D is used repeatedly in the same field. Rotate Group M fungicides with fungicides with a different mode of action.**

## Precautions:

Keep out of reach of children. May cause irritation to eyes, nose, throat and skin. Avoid inhalation and contact with eyes, skin or clothes. Wear protective equipment and clothing including goggles or face shield, rubber gloves, hat, long-sleeved shirt, trousers and rubber boots.

# Potato ST 16/MancoPlus/Tuberseal

**See Mancozeb-based Fungicides on page 281.**

# Prosper FL/ Poncho 600 FS/Poncho 600

**Fungicide Group – 4, 7, M**
*(Refer to page 230)*

**Products available to commercial seed treaters only. Poncho 600 FS and Poncho 600 contain insecticide only.**

## Company:

Bayer CropScience (Prosper FL – PCP# 27564;
Poncho 600 FS – PCP# 27453;
Poncho 600 – PCP# 27449)

## Formulation:

**Prosper FL:** 120 g/L clothianidin; 56 g/L carbathiin; 120 g/L thiram; 4 g/L metalaxyl.
Container sizes: 3.8L, 10L, 100L, 1000L, Bulk

**Poncho 600 FS / Poncho 600:** 600 g/L clothianidin.
Container sizes: 3.8L, 10L, 100L, 200L

## Crops and Staging:

**All products:** Canola.

**Poncho 600 FS/Poncho 600 only:** Corn.

Seed treatment.

## Rates, Insects and Diseases Controlled:

| PRODUCT | CROP | RATE (ML) PER 100 KG OF SEED | INSECTS CONTROLLED | DISEASES CONTROLLED |
|---|---|---|---|---|
| Prosper FL[1] | Canola, Rapeseed | 1250 mL | Flea beetles | Seed rot, damping off, seedling blight and early season root rot caused by *Pythium*, *Rhizoctonia*, *Fusarium*, and seed-borne *Alternaria* spp.; Seed-borne blackleg (*Leptosphaeria maculans*). |
| Poncho 600 FS; Poncho 600 | Canola, Rapeseed | 250, 333 or 666 mL[2] | Flea beetles | — |
| | Corn | 33.3 to 66.6 mL of product per 80,000 units of seed (0.25 to 0.5 mg a.i. per kernel) | Wireworm; Seed corn maggot; Black cutworms; Corn flea beetle; White grubs | — |

[1] Use Prosper FL for low to moderate flea beetle pressure only; OR, mix with Poncho 600 FS to provide longer season control of flea beetles and for areas where flea beetle populations are high. Refer to labels for rates and mixing instructions.

[2] Use increasing rates for low, moderate and severe flea beetle pressure.

## Cost:

Not available.

## Application Information:

These products are for use in commercial seed treatment facilities with closed transfer systems only. Products do not contain a colourant. An appropriate colour must be added when this product is applied. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. Keep Prosper FL above 10°C prior to and during application. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

## How it Works:

Clothianidin is a chloronicotinyl insecticide with systemic activity. Carbathiin is a carboximide fungicide with systemic activity; thiram is a dithiocarbamate fungicide with contact activity; and metalaxyl is an acylalanine fungicide with systemic activity.

## Restrictions:

**Use:** Treated seed must be labelled as follows: **"This seed has been treated with clothianidin and/or carbathiin, thiram and metalaxyl. Do not use for food, feed or oil processing. Store away from feeds and other foodstuffs."**

**Storage:** Protect seed treatments from freezing. Do not store Prosper FL above 35°C. Do not store treated seed above 25°C or in direct sunlight. Treated seed stored for periods in excess of 9 months should be tested for germination before planting.

**Re-planting:** Corn and canola may be replanted at any time. A 1-year plant back interval is required for leafy, root and tuber vegetables. A 30-day plant back is required for cereals, grasses, nongrass animal feeds, soybeans and dry beans.

**Environment:** These products are toxic to aquatic invertebrates. Do no apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment wash waters. These products are toxic to birds and mammals. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface.

## Precautions:

Keep out of reach of children. Harmful is swallowed or absorbed through skin. Do not get Prosper FL into eyes. Work in a well-ventilated area when handling products or treated seed. Workers involved in treating or handling treated seed must wear coveralls over long-sleeved shirt and long pants, chemical-resistant gloves, head gear and respiratory protection.

## Hazard Rating:

☠ Warning Poison

# Raxil 250 FL

**Fungicide Group – 3**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 26138

## Formulation:

6 g/L tebuconazole formulated as a flowable seed treatment. Container size: 2 x10 L, 200 L.

## Crops and Staging:

Wheat, barley and oats. Seed treatment.

## Rates and Diseases Controlled:

| CROP | UNDILUTED USE RATE (ML) PER 100 KG OF SEED* | KG SEED TREATED BY 10L OF CONCENTRATE | DISEASES CONTROLLED | DISEASES SUPPRESSED** |
|---|---|---|---|---|
| **Wheat** | 252 - 332 | 4000 - 3000 | Seed rot and Seedling blights caused by *Fusarium* spp.;<br>Loose smut;<br>Stinking smut (bunt) | Root rot caused by *Cochliobolus sativus;*<br>Crown and root rot caused by *Fusarium* spp. |
| **Barley** | 252 - 332 | 4000 - 3000 | Seed rot and Seedling blights caused by *Fusarium* spp.; Barley leaf stripe; False loose smut; Covered smut; True loose smut | Crown and root rot caused by *Fusarium* spp. |
| **Oats** | 332 - 500 | 3000 - 2000 | Loose smut | |

* For dilution information, see "triple rinse instructions" on product label.

** For the suppression of common root rot of wheat, use the higher rate. Use higher rates where disease levels are likely to be high or on highly susceptible varieties.

## Cost (2005 suggested retail price):

**Wheat, barley:** $7.18 to $9.46 per 100 kg of seed

**Oat:** $9.46 to $14.25 per 100 kg seed

## Application Information:

Raxil 250 FL is a ready to use formulation designed for commercial or on-farm treatment with conventional seed treating equipment which can accurately control application rates and provide a good distribution of chemical onto seed. It is important that the seed and chemical are mixed quickly and uniformly. See manufacturer's instructions supplied with the treater system for information on proper application technique.

Uniform coverage at the correct rate is important for satisfactory results. Under-treatment may lead to loss of efficacy and over-treatment could reduce germination. Seed may be planted immediately after treating.

## How it Works:

The active ingredient tebuconazole is a systemic triazole fungicide that provides broad-spectrum protection against seed and soil-borne diseases.

## Restrictions:

**Use:** Treated seed must be labelled "This seed has been treated with Raxil 250 FL (tebuconazole); do not use for food, feed or oil processing. Wear a long sleeved shirt and long pants (or coveralls) and chemical resistant gloves when handling treated seed."

**Storage:** Store product in original container, away from other pesticides, fertilizer, food or feed. Grazing: Do not feed or graze livestock on treated areas for 4 weeks after planting.

**Environment:**: Do not contaminate pods, lakes or streams.

**Resistance: Raxil 250 FL contain a triazole fungicide. Some loss of disease control may occur over time due to the development of resistant strains of pathogens if Raxil 250 FL or other Group 3 fungicides are used repeatedly or consecutively in successive years on same fields, Alternate use of Raxil 250 FL with fungicides with a different mode of action in your disease control program.**

## Precautions:

Keep out of reach of children. Do not get into eyes or onto skin. Work in a well ventilated area. Wear coveralls, chemical resistant gloves, a dust mask or respirator fitted to exclude dust, and goggles when treating seed or while handling treated seed.

## Hazard Rating:

Danger skin irritant.

# Raxil T

**Fungicide Group – 3, M**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 27566

## Formulation:

6.7 g/L tebuconazole plus 222 g/L thiram. Formulated as a flowable seed treatment. Container size: 10 L, 100 L, 200 L, 1000L.

## Crops and Staging:

Wheat, barley and oats. Seed treatment.

## Rates and Diseases Controlled:

| CROP | USE RATE (ML) PER 100 KG SEED | DISEASES CONTROLLED | DISEASES SUPPRESSED |
|---|---|---|---|
| **Wheat** | 225 | Seed-borne seed rot and seedling blight caused by *Fusarium*;<br>Seed rot and seedling blight caused by *Cochliobolus sativus;*<br>Seed rot caused by saprophytic fungi *Penicillium, Aspergillus* and *Alternaria;*<br>Seed-borne *Septoria;* Stinking smut (bunt);<br>Loose smut; *Pythium* seed rot | *Fusarium* root and crown rot;<br>Common root rot caused by *Cochliobolus sativus* |
| **Barley** | 225 | Seed-borne seed rot and seedling blight caused by *Fusarium;*<br>Seed rot and seedling blight caused by *Cochliobolus sativus;*<br>Seed rot caused by saprophytic fungi *Penicillium, Aspergillus* and *Alternaria;*<br>False loose smut; Covered smut; Loose smut; *Pythium* seed rot | *Fusarium* root and crown rot;<br>Common root rot caused by *Cochliobolus sativus* |
| **Oats** | 225 | Seed-borne seed rot and seedling blight caused by *Fusarium;*<br>Seed rot and seedling blight caused by *Cochliobolus sativus;*<br>Loose smut; *Pythium* seed rot | Common root rot caused by *Cochliobolus sativus* |

## Cost (2005 suggested retail price):

Not available

## Application Information:

Raxil T is a ready to use formulation designed for commercial or on-farm treating with conventional seed treating equipment which can accurately control application rates and provide good distribution of chemical. Uniform coverage at the correct rate is important for satisfactory results.

Germination will not be affected by treatment as long as over-application does not occur and seed is properly stored. Seed may be planted immediately after treating.

## How it Works:

The active ingredient tebuconazole is a systemic triazole fungicide that provides broad-spectrum protection against seed and soil-borne diseases. The active ingredient thiram is a dithiocarbomate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed must be labelled "This seed has been treated with Raxil T which contains the fungicides tebuconazole and thiram". Do not use for food, feed or oil processing.

**Storage:** Store product in original container, away from other pesticides, fertilizer, feed and food. Store in a cool, dry place and avoid heat.

**Grazing:** Do not feed or graze livestock on treated areas for 4 weeks after planting.

**Environment:** Do not contaminate water, food, or feed by storage, disposal, or by cleaning of equipment. Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed.

**Resistance:** Raxil T contains Group 3 and Group M fungicides. Some loss of disease control may occur over time due to the development of resistant strains of pathogens if Raxil T or other fungicides if these groups are used repeatedly or consecutively in successive years on same fields. Alternate use of Raxil T with fungicides with a different mode of action in your disease control program.

## Precautions:

Keep out of reach of children. Harmful if inhaled. May irritate the skin. Work in a well ventilated area when treating seed or while augering or handling treated seed. Applicators and handlers must wear coveralls over long-sleeved shirt and pants, chemical resistant gloves, protective eyewear and a NIOSH approved respirator.

## Hazard Rating:

Caution - Skin irritant.

☠ Caution Poison.

# Senator PSPT

**Fungicide Group – 1**
*(Refer to page 230)*

## Company:

Engage Agro Corporation PCP# 26236

## Formulation:

10% thiophanate-methyl formulated as dust.
Container size: 10 kg.

## Crops and Staging:

Potatoes. Seed piece treatment.

## Diseases Controlled:

*Fusarium* rot, *Verticillium* wilt, silver scurf (*Helminthosporium solani*). Also aids in control of seed piece decay and blackleg infections.

## Cost (2005 suggested retail price):

$9.98 per kg; $4.99 to treat 100 kg cut seed.

## Rate:

Use 500 g per 100 kg cut seed (one bag treats 2,000 kg seed).

## Application Information:

Apply in a convenient container or by dust attachment over belt. Cut pieces should be treated within 6 hours of cutting. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential. Cut pieces should be treated within 6 hours of cutting. If planting is to be delayed more than 1 to 2 days, the treated pieces should be stored for 2 to 3 days in open crates before bagging. This product contains no colourant; an appropriate colourant must be added when this product is applied.

## How it Works:

The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity.

## Restrictions:

**Storage:** Store product in a dry place. Avoid contamination of feed or food stuffs.

**Environment:** Do not contaminate domestic or irrigation water supplies, lakes, streams and ponds.

**Resistance: Strains of fungi may develop tolerance to Senator PSPT or other Group 1 fungicides after prolonged use. Use full label rates of Senator PSPT and ensure thorough coverage. When possible, alternate with products from different chemical families. If potatoes are going to be treated with Mertect prior to storage in the fall, do not use Senator PSPT or any other product containing thiophanate-methyl at planting. Do not use Senator PSPT or any other product containing thiophanate-methyl if Mertect was used as the storage treatment on the seed.**

## Precautions:

Keep out of reach of children. May be harmful if swallowed. Avoid inhalation of dust. Wash hands and face after handling.

# Thiram 75WP

**Fungicide Group – M**
*(Refer to page 230)*

## Company:

Bayer Crop Science PCP# 27556

## Formulation:

75% thiram formulated as wettable powder. Container sizes: 5 kg, 25 kg.

## Crops and Staging:

Mustard, grasses, dry beans, peas, soybeans, safflower, corn, and alfalfa. Seed treatment.

## Diseases Controlled:

Seed decay, seedling blight, damping off.

## Cost (2005 suggested retail prices):

**Mustard, grasses, alfalfa:** $14.36 per 100 kg seed
**Dry bean, pea, soybean:** $4.00 to $5.60 per 100 kg seed
**Corn:** $4.80 per 100 kg of seed
**Safflower:** $8.00 per 100 kg of seed

## Rates:

| CROP | GRAMS THIRAM/ 100 KG SEED | AMOUNT OF SEED (KG) ONE 5 KG PACKAGE TREATS |
|---|---|---|
| Mustard, grasses, alfalfa | 360 | 1,389 |
| Dry beans, peas, soybeans | 100 - 140 | 3,571 - 5,000 |
| Field corn | 120 | 4,166 |
| Safflower | 200 | 2,500 |

## Compatibility with Rhizobia-based Inoculants:

Thiram is compatible with Rhizobia, however, some restrictions may apply in storage length with Thiram-treated seed inoculated with Rhizobia. Contact Rhizobia manufacturer on use patterns with their Rhizobia strain.

## How it Works:

The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed should be labelled **"Do not use for food or feed. This seed has been treated with thiram"**

**Storage:** Store in a cool, dry, ventilated place, away from feeds and foods. Keep away from flame, sparks and heat.

**Grazing:** Do not graze treated areas or feed clippings from treated areas to livestock.

## Precautions:

Do not consume alcohol 24 hours before or after working with thiram. Avoid breathing dust or spray mist. When treating, augering or handling treated seed, work in a well-ventilated area and wear a suitable dust mask, goggles and gloves.

## Hazard Rating:

☠ Warning Poison

# Vitaflo 280

**Fungicide Group – 7, M**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 11423

## Formulation:

**Vitaflo 280:** 15.59% carbathiin and 13.95% thiram formulated as a liquid suspension.
Container sizes: 10 L, 100 L, 200 L, 1000 L.

## Crops, Rates and Diseases Controlled:

| CROP | USE RATE (ML) PER 100 KG SEED | DISEASES CONTROLLED | DISEASES SUPPRESSED |
|---|---|---|---|
| Barley | 230 - 330[1] | False loose smut; True loose smut; Covered smut; Leaf stripe; Seed rot and seedling blight caused by *Cochliobolus sativus, Fusarium, Pythium, Aspergillus, Penicillium* and *Alternaria* spp. | Suppression of root rot caused by *Cochliobolus sativus* and *Fusarium* spp.; Suppression of netblotch |
| Wheat | 230 - 330[1] | Loose smut; Stinking smut (bunt); Seed-borne dwarf bunt; Seed-borne *Septoria*; Seed rot and seedling blight caused by *Cochliobolus sativus, Fusarium, Pythium, Aspergillus, Penicillium* and *Alternaria* spp. | Suppression of root rot caused by *Cochliobolus sativus* and *Fusarium* spp. |
| Oats | 330 | Loose smut; Covered smut; Seed rot and seedling blight caused by *Fusarium, Pythium, Aspergillus, Penicillium* and *Alternaria* spp. | Suppression of root rot caused by *Cochliobolus* sativus |
| Rye | 230 - 330[1] | Stem smut; Seed rot and seedling blight caused by *Fusarium, Pythium, Aspergillus, Penicillium* and *Alternaria* spp. | Suppression of root rot caused by *Cochliobolus sativus* and *Fusarium* spp. |
| Triticale | 200 | Seed rot, damping off and seedling blight | |
| Dry beans | 260[2] | Seed rot, seedling blight, and root rot caused by *Rhizoctonia solani*; Seed-borne anthracnose *(Colletotrichum lindemuthianum)* | |
| Corn | 280<br>560 - 748[3] | Seed rot and damping off<br>Seed-borne head smut | |
| Flax, Linola | 525 | Seed rot, root rot and seedling blight caused by *Rhizoctonia solani* and *Fusarium* spp. | |
| Lentils | 330 | Seed rot, seedling blight, and early season root rot caused by *Botrytis cinerea, Rhizoctonia solani, Fusarium* and *Pythium* spp. | |
| Peas | 260 - 330[4] | Seed rot and seedling blight caused by ascochyta (*Mycosphaerella*), *Rhizoctonia solani, Fusarium* and *Pythium* spp. | |
| Soybeans | 260 | Seed rot and seedling blight caused by *Rhizoctonia solani, Phomopsis* and *Fusarium* spp. | |

(see footnotes on following page)

[1] The low rate will give partial control of true loose smut in wheat/barley and stem smut in rye. Use the high rate for septoria, seed rot and seedling blight, and suppression of root rot.

[2] Vitaflo 280 will not protect against wind-borne anthracnose spores. This product will not control anthracnose if seed is severely infected.

[3] Use 140-187 mL per 25 kg seed to control head smut of corn.

[4] Use high rate on peas to control ascochyta (*Mycosphaerella pinodes*)

## Cost (2005 suggested retail price):

**Barley, wheat, rye:** $5.45 to $7.82 per 100 kg seed
**Triticale:** $4.74 per 100 kg seed
**Peas:** $6.16 to $7.82 per 100 kg of seed
**Lentils, oats:** $7.82 per 100 kg seed
**Flax:** $12.44 per 100 kg seed
**Beans, soybeans:** $6.16 per 100 kg seed
**Corn:** $6.64 to $17.77 per 100 kg seed

## Application Information:

Vitaflo 280 is designed to be used undiluted in commercial seed treaters, but can be diluted with water for use in slurry treaters. Undiluted Vitaflo 280 can be used at temperatures down to -30°C. Centrifugal pumps are not recommended for pumping Vitaflo 280. Use of a Vitaflo Pump is recommended. If containers have been in storage, some settling may occur and require agitation.

## How it Works:

The active ingredient carbathiin is carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Tank Mixes:

Mixing of Vitaflo 280 with solvent based products may result in gelling or sedimentation. Seed treater lines and reservoirs should be thoroughly cleaned before use of Vitaflo 280.

## Compatibility with Rhizobia-based Inoculants:

Vitaflo 280 is compatible with Rhizobia. Do not tank mix Vitaflo 280 and Rhizobia. Always check with Rhizobia manufacturers on any restrictions that may exist with seed treatments.

## Restrictions:

**Use:** Seed treated with Vitaflo 280 must be labelled as follows **"This seed has been treated with Vitaflo 280 liquid seed protectant containing carbathiin and thiram. Do not use for feed, food, or oil processing. When augering or handling treated seed work in well-ventilated area and wear suitable mask, goggles and gloves."** Do not use treated seed for feed, food or oil processing.

**Storage:** Do not store Vitaflo 280 in direct sunlight or above 35°C. Vitaflo 280 will not freeze even at extreme temperatures. Do not store dry beans or soybeans treated with Vitaflo 280. Wheat, barley, rye, oats, triticale and flax seed treated with Vitaflo 280 can be stored up to 18 months without reduction in germination. Corn seed treated with Vitaflo 280 can be stored up to one year without reduction in germination.

**Grazing:** Do not graze or feed livestock on treated area for four weeks after planting except for the following crops: Soybeans - do not graze or feed livestock on forage and hay on treated areas; Bean - Do not graze or feed on bean forage for 60 days; Barley, oats, wheat - Do not graze or feed on treated area for 6 weeks.

**Environment:** Do not contaminate ponds, lakes or streams.

**Resistance: Vitaflo 280 contains Group 7 and Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate Vitaflo 280 and other Group 7 and M fungicides with different groups that control the same pathogen.**

## Precautions:

Keep out of reach of children. Harmful if swallowed, inhaled or absorbed through skin. Do not get into eyes. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear long sleeved coveralls, a suitable dust mask, goggles and chemical resistant gloves.

## Hazard Rating:

Warning Eye Irritant
Caution Skin Irritant

# Vitavax rs Fungicide

**Fungicide Group – 7, M**
*(Refer to page 230)*

**This seed treatment is available to commercial seed treaters only.**

## Company:

Bayer CropScience PCP# 25862

## Formulation:

5.97% carbathiin and 11.94% thiram as a liquid seed treatment. Container size: 10 L, 100 L, 200 L, 1000 L

## Crops and Staging:

Canola, rapeseed and mustard. Seed treatment.

## Diseases Controlled:

**Canola, rapeseed and mustard:** Seed rot, seedling blight, damping off and early season root rot caused by species of *Rhizoctonia*, *Pythium* and *Alternaria*.

**Canola and rapeseed:** Seed-borne blackleg.

## Cost:

Not available.

## Rate:

833 to 1250 mL per 100 kg of seed. 100 L will treat 8,000 to 12,000 kg of seed

## Application Information:

Prior to and during application, Vitavax rs Fungicide must be thoroughly agitated to ensure uniform mixing of product. Vitavax rs Fungicide treated seed does not require drying after treatment. Refer to label for rinsate instructions.

## How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Registered Mixes:

Can be co-applied on the seed with Apron FL (Allegiance FL) and Gaucho 480 FL.

## Restrictions:

**Use:** Treated seed must be labelled "**This seed has been treated with Vitavax rs Fungicide, containing carbathiin and thiram, do not use for food, feed or oil processing.**" Do not reuse container for any purpose. Augers used for handling treated seed should not be used to move seed for feed, food or oil processing. Do not reuse bags from treated seed to handle food or feed products. Do not contaminate feed or food-stuffs with treated seed.

**Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Treated canola or rapeseed stored for periods more than 9 months should be tested for germination before planting. Storage of Vitavax rs Fungicide at low temperatures is not recommended. Keep product above 10°C prior to and during application. Do not store treated seed above 25°C or in direct sunlight. Protect from freezing.

**Grazing:** Do not feed or graze livestock on treated areas for four weeks after planting.

**Environment:** Do not contaminate ponds, lakes or streams.

**Resistance:** Vitavax rs Fungicide contains Group 7 and Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate this product and other Group 7 and M fungicides with different groups that control the same pathogen.

## Precautions:

Keep out of reach of children. Do not get into eyes. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear chemical resistant gloves when handling product or treated seed and goggles to protect eyes from possible splashing.

## Hazard Rating:

Caution Poison.

Caution Eye Irritant.

# Vitavax Single Solution

**Fungicide Group – 7**
*(Refer to page 230)*

## Company:

Bayer CropScience PCP# 14069

## Formulation:

230 g/L carbathiin formulated as a solution.
Container sizes: 10 L, 200 L.

## Crops and Staging:

Barley, wheat, oats, rye, flax. Seed treatment.

## Cost

Not Available

## Diseases Controlled:

| BARLEY | WHEAT | OATS | RYE | FLAX |
|---|---|---|---|---|
| Covered smut<br>True loose smut<br>False loose smut<br>Seed rot<br>Seedling blight<br>*Suppression of net blotch, leaf stripe, common root rot | Loose smut<br>Stinking smut (bunt)<br>Seed rot<br>Seedling blight<br>*Suppression of common root rot | Covered smut<br>Loose smut<br>Seed rot<br>Seedling blight<br>*Suppression of common root rot | Stem smut<br>Seed rot<br>Seedling blight<br>*Suppression of common root rot | Seed rot<br>Seedling blight |

* will not protect plants from infection beyond the first leaf stage

## Rates:

| CROP | ML/100 KG SEED | KG SEED TREATED/ 10 L CONTAINER |
|---|---|---|
| Wheat** | 240 - 300 | 4,167 - 3,333 |
| Barley** | 240 - 300 | 4,167 - 3,333 |
| Oats | 240 | 4,167 |
| Rye | 240 | 4,167 |
| Flax | 400 | 2,500 |

** For wheat and barley varieties highly susceptible to true loose smut and for high levels of smut or bunt on seed, the 300 mL rate will give increased disease control.

## Application Information:

Vitavax Single Solution is a ready to use formulation designed for commercial treaters and on-farm auger treating. Do not dilute with water. It is important that the seed and chemical are mixed quickly and uniformly. See instructions supplied with the applicable treater system.

## How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity.

## Restrictions:

**Use:** Treated seed must be labelled as followed: **"This seed has been treated with Vitavax Single Solution Seed Protectant. Contains carbathiin; do not use for food, feed or oil processing."** Do not contaminate feed or foodstuffs.

**Storage:** Do not store below 0°C. Product is flammable. Keep away from flame and sparks.

**Grazing:** Do not graze or feed livestock on treated areas for four weeks after planting.

**Environment:** Do not contaminate ponds, lakes or streams.

**Resistance: Vitavax Single Solution contains a Group 7 fungicide. A gradual or total loss of pest control may occur over time if this fungicide is used repeatedly in the same fields. Rotate this product and other Group 7 fungicides with different groups that control the same pathogen.**

## Precautions:

Keep out of reach of children. Work in a well-ventilated area when treating or handling treated seed. Wear a suitable mask, gloves and goggles. Product may damage painted surfaces by removing paint or leaving stain. Do not use rubber or PVC hose.

# Insect Control

## Additional Resources

For information on insect control on livestock or livestock housing facilities see:

http://www.agr.gov.sk.ca/apps/insectPest/default.asp

For information on insect management in commodities other than livestock or those covered in this guide see the WCCP Guide to Integrated Control of Plant Pests at: http://www.members.shaw.ca/dan-johnson/wccpabout.html

## Insect Control Decisions

Control of insects should be considered when numbers or damage exceed economic thresholds. To select an insecticide, verify the registered products for the insect and field crop in the following tables. Consideration should then be given to the rates, cost, preharvest intervals, the product application, restrictions, precautions and the hazard rating. The **preharvest interval** is the number of days that must pass between the last application of a pesticide and harvest. Harvest is the cutting of the crop or removal of the produce from the plant.

It includes direct-combining, cutting (swathing) or grazing; it does not include swath-combining or baling for hay.

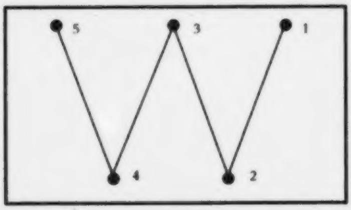
## Field Scouting

Field scouting is the regular examination of fields to accurately assess the kind and the number of insects present and the amount of damage being done. Scouting should be done weekly during the growing season and daily when infestations approach economic levels or when weather conditions favour the rapid development of specific pests.

To properly scout for insect pests, you must know when they occur, where they live, what they look like, and how to find and count them. Generally, in fields of less than 100 acres, check a minimum of five locations. In fields greater than 100 acres, check a minimum of 10 locations. There are several possible scouting patterns that can be used when checking fields. These options are based on pest distribution and field configuration.

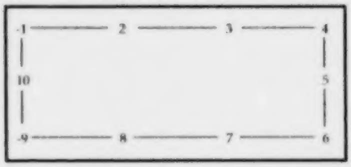
**Pattern 1:** Used when pests are uniformly distributed.

This scouting pattern typically looks like an X, Z or W, excluding field edges. Pests that fit this pattern include aphids, bertha armyworm, diamondback moth, lygus bugs.



**Pattern 2:** Used when pests are at the edges of fields.

Scout by walking along field edges, fence lines or ditches. Some examples of pests appearing at the edges of fields include flea beetles, colorado potato beetles and grasshoppers.



Monitoring methods, typical symptoms and **economic thresholds** for the more common crop pests are described in the field scouting section for each commodity. The **economic threshold** is the minimum number of insects or damage to the crop that should result in management action. Note that factors such as moisture, temperature conditions and stage of crop growth, can increase or decrease the impact of insects on crop production.

## Estimating Percent Defoliation

Many action thresholds for insects are based on percent defoliation of the plants they are feeding on. The following figure may assist in determining the percent defoliation. Although the photo below is of sunflower leaves, this figure can be used to estimate % defoliation for many crops.

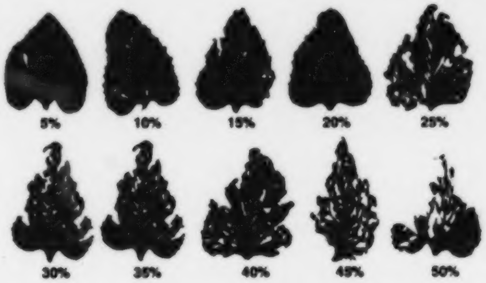


*Photo courtesy of North Dakota State University Extension Service*

## Reducing Bee Losses from Insecticides

Careless use of insecticides can kill bees and other beneficial insects such as pollinators, predatory and parasitic biological control insects. Help to reduce insecticide poisoning of bees by:

1. **Avoid applying insecticides which are toxic to bees on crops in bloom.** Any field with even a small amount of bloom, whether it is the main crop, cover crop, or weeds will probably have foraging bees visiting the flowers. If at all possible, apply insecticides before or after the crop has gone into bloom. Control all flowering weeds prior to insecticide application.

2. **Apply insecticides when bees are least active.** The highest level of bee activity occurs during the day. Apply insecticides in late evening or early morning when the bees are not foraging. As a general rule, evening applications are less hazardous to bees than morning applications.
3. Avoid insecticide drift. To avoid insecticides drifting into non-target locations, do not apply insecticides during windy conditions. Choose nozzles with a low drift rating. As a general rule, ground applications of insecticide are less prone to drift than aerial applications.
4. Contact the beekeeper before spraying. Communication and cooperation between the insecticide applicator and the beekeeper can usually prevent bee losses. Notifying the beekeeper in advance (i.e. 48 hours) of applying insecticides will allow the beekeeper to move or protect the colonies from insecticide damage.
5. If possible, use insecticides and/or insecticide formulations which are the least hazardous to bees. The following table "Field Hazard of Insecticides to Bees" will help in selecting the least hazardous insecticide. In general, dusts are more hazardous to bees than sprays. Wettable powders are more hazardous than emulsifiable concentrates (EC) or water-soluble formulations. Granular insecticides and spreadable bran bait insecticides are generally the least hazardous to bees.

## Field Hazard of Insecticides to Bees

The following table indicates the maximum time required for the insecticides listed in the Guide to be degraded by weather to a low hazard level for bees. **These times are to be used as general guidelines only.** Most of these insecticides have not been tested for bee toxicity under Western Canadian conditions and environmental conditions influence the rate at which pesticides degrade.

| INSECTICIDE | TOXICITY RATING | | RESIDUE HAZARD (DAYS)[a] |
|---|---|---|---|
| | HONEY BEE | LEAFCUTTER BEE | |
| Admire | 1 | 1 | –[b] |
| Cygon/Lagon | 1 | 1 | 10 |
| Decis | 2 | 2 | 1 |
| Diazinon | –[b] | –[b] | –[b] |
| Dibrom | 1 | 1 | –[b] |
| Eco bran | 3 | 3 | N/A |
| Furadan | 1 | 1 | 5 |
| Lannate | 1 | 1 | 1.5 |
| Lorsban/Nufos/Pyrinex/ Chlorpyrifos | 1 | 1 | 3.5 |
| Malathion | 2 | 1 | 2 (Honey Bee),<br>6 (Leafcutter Bee) |
| Matador | 2 | 2 | 1 |
| Monitor | 1 | 1 | 1 |
| Pounce | 1 | 1 | 5 |
| Ripcord | –[b] | –[b] | –[b] |
| Sevin | 1 | 1 | 7 |
| Thiodan/Thionex | 2 | 1 | 2 |

**TOXICITY RATING** 1 = High 2 = Moderate 3 = Low

[a] Residue hazard represents the average time in days that residues poisonous to bees will remain on foliage. Most of this information has not been generated under Western Canadian growing conditions and should be used only as a guideline.

[b] Information currently not available, although these products are known to be toxic to bees.

## Field Scouting in Alfalfa

### SAP FEEDERS

**Lygus bugs/Alfalfa plant bug**

*Typical Damage:* Field blooms poorly or not at all. Flower buds blasted, whitish, and dry; flowers dropping off before fully open. Collapsed seed.

*When and How to Monitor:* Look for plant bugs when monitoring alfalfa in June through mid-August. Make five 180º sweeps with a 15-inch (40 cm) insect net through alfalfa canopy at each sampling site. Record total number of plant and lygus bugs (both nymphs and adults) captured. Calculate average number per sweep.

*Economic Threshold:* Hay: Control not recommended. Seed alfalfa at bud and early bloom: 8 lygus bugs/sweep; 4 alfalfa plant bugs/sweep; or 5 bugs if the plant bug population is a combination of lygus bugs and alfalfa plant bug. If insecticides are used, attempt to spray before the onset of bloom. Protecting insect pollinators in seed production fields is very important.

**Pea Aphid**

*Typical Damage:* Suck juices from plants; stunt growth; cause premature drying.

*When and How to Monitor:* Look for when monitoring in July through August. Take 5 sweeps at each location. Monitor fields closely during periods of slow plant growth.

*Economic Threshold:* 100-200 aphids/180°sweep when crop is moisture stressed, or until mid-August.

### DEFOLIATORS

**Alfalfa Weevil**

*Typical Damage:* Feed on developing buds and leaves. Stunt growth.

*Economic Threshold:* Alfalfa Hay: One of the best control strategies is to cut fields for hay early. If early cutting of the hay crop is not possible, treatment should be considered when 25-50% of leaves on the upper one-third of the stem show damage or 50-70% of terminals show injury. Alfalfa Seed: 20-25 larvae/sweep (90°=straight sweep) or 35-50% of foliage tips showing damage.

### LEAFMINERS

**Alfalfa Blotch Leafminer**

*Typical Damage:* Females feed by puncturing leaves with their ovipositors, creating characteristic "pinholes," and consuming plant juices. A single female creates an average of 3,769 pinholes during her lifetime. Larvae create distinctive mines as they feed. Infested fields take on a whitish cast due to the larval mines in the leaves.

*Economic Threshold:* Treatment is suggested if 30-40% of the plants exhibit pinhole feeding injury. If insecticides are used, they must be applied during the "pinhole" stage.

**Alfalfa Insect Management Chart**

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Sap Feeders** | | | | | | |
| **Lygus bugs** | Matador (P) | 0.034 L | $5.07 | Do not apply within 3 days of livestock foraging. | A or G | 64-110 |
| | Decis 5EC (seed production only) (P) | 0.08-0.1 L | $7.52-$9.40 | 20 | G | 395 |
| | Malathion 500 (OP) | 0.80-1.21 L | $10.16-$15.37 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.91-1.11 L | $11.24-$13.71 | 7 | A or G | 1375-2800 |
| | Dibrom (OP) | 0.44-0.88 | $14.30-$28.59 | 4 | A or G | 345 |
| | Cygon (alfalfa) (OP) | 0.17 L | $4.56 | 2 | A or G | 450 |
| | Cygon 480 (alfalfa seed production) (OP) | 0.44 L | $11.81 | 28 | A or G | 450 |
| | Lagon (seed production only) (OP) | 0.44 L | $12.45 | 28 | A or G | 60 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Alfalfa plant bug** | Cygon 4-E (alfalfa) (OP) | 0.17 L | $4.56 | 2 | A or G | 450 |
| | Cygon 480 (alfalfa seed production) (OP) | 0.44 L | $11.81 | 28 | A or G | 450 |
| | Lagon (seed production only) (OP) | 0.44 L | $12.45 | 28 | A or G | 60 |
| **Potato leafhopper** | Matador (P) | 0.034 L | $5.07 | Do not apply within 3 days of livestock foraging. | A or G | 64-110 |
| | Sevin (C) | 1.01-1.6 L | $15.35-$24.32 | 2 | A or G | 649 |
| | Malathion 500 (OP) | 0.80-1.21 L | $10.16-$15.37 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.91-1.11 L | $11.24-$13.71 | 7 | A or G | 1375-2800 |
| | Dibrom (OP) | 0.44-0.88 L | $14.30-$28.59 | 4 | A or G | 345 |
| | Lagon (OP) | 0.17 L | $4.81 | 2 | A or G | 480 |
| | Cygon (OP) | 0.17 L | $4.56 | 2 | A or G | 450 |
| **Pea Aphid** | Matador (P) | 0.034 L | $5.07 | Do not apply within 3 days of livestock foraging. | A or G | 64-110 |
| | Malathion 500 (OP) | 0.80-1.21 L | $10.16-$15.37 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.91-1.11 L | $11.24-$13.71 | 7 | A or G | 1375-2800 |
| | Dibrom (OP) | 0.44-0.88 L | $14.30-$28.59 | 4 | A or G | 345 |
| | Cygon (OP) | 0.17 | $4.56 | 2 | A or G | 450 |
| | Lagon (OP) | 0.17 L | $4.81 | 2 | A or G | 60 |
| **Spider mites** | Malathion 500E (OP) | 0.91-1.11 L | $11.24-$13.71 | 7 | A or G | 1375-2800 |
| | | | **Defoliators** | | | |
| **Grasshoppers** | **Spreadable Bran Baits** | | | | | |
| | Eco bran (C) | 0.8-1.6 kg | $3.00-$6.00 | 2 | G | NA |
| | **Sprays** | | | | | |
| | Matador (young grasshoppers only) (P) | 0.025-0.034 L (Ground)<br>0.034 L (Aerial) | $3.88-$5.07<br>$5.07 | Do not apply within 3 days of livestock foraging. | A or G | 64-110 |
| | Sevin (C) | 0.50-1.01 L | $7.60-$15.35 | 2 | A or G | 649 |
| | Malathion 500 (young grasshoppers) (OP) | 0.80-1.21 L | $10.16-$15.37 | 7 | A or G | 4302 |
| | Malathion 500E (young grasshoppers) (OP) | 0.91-1.11 L | $11.24-$13.71 | 7 | A or G | 1375-2800 |
| | Cygon 4E (OP) | 0.17-0.34 L | $4.56-$9.13 | 2-7 | A or G | 450 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| | Cygon 480 (OP) | 0.22 L (young)<br>0.34-0.36 L (adults) | $5.91<br>$9.13-$9.67 | 2<br>28 | A or G | 450 |
| | Lagon (OP) | 0.22-0.36 L | $6.23-$10.19 | 2-7 | A or G | 60 |
| **Alfalfa weevil** | If alfalfa has reached the bud or early bloom stage, immediate **cutting** will kill many alfalfa weevil larvae | | | | | |
| | Matador (P) | 0.034 L | $5.07 | Do not apply within 3 days of livestock foraging. | A or G | 64-110 |
| | Decis 5EC (seed crops only) (P) | 0.08-0.1 L | $7.52-$9.40 | 20 | G | 395 |
| | Malathion 500 (OP) | 0.80-1.21 L | $10.16-$15.37 | 7 | A or G | 4302 |
| | Malathion 500E (larvae only) (OP) | 0.91-1.11 L | $11.24-$13.71 | 7 | A or G | 1375-2800 |
| | Imidan (OP) | 0.91 kg | $22.20 | 7 | G | 285 |
| | Cygon (OP) | 0.17 L | $4.56 | 2 | A or G | 450 |
| **Sweet clover weevil** | Cygon 4E (OP) | 0.34-0.44 L | $9.13-$11.81 | 28 | A or G | 450 |
| **Blister beetle** | Sevin (C) | 1.01-1.6 L | $15.35-$24.32 | 2 | A or G | 649 |
| **True Armyworm** | Sevin (C) | 1.01-2.12 L | $15.35-$32.22 | 2 | A or G | 649 |
| **Beet webworm** | Sevin (C) | 1.01-2.12 L | $15.35-$32.22 | 2 | A or G | 649 |
| **Alfalfa looper** | Dibrom (OP) | 0.44-0.88 L | $14.30-$28.59 | 4 | A or G | 345 |
| **Alfalfa Caterpillar** | Sevin (C) | 1.01-2.12L | $15.35-$32.22 | 2 | A or G | 649 |
| **Leafminers** | | | | | | |
| **Alfalfa blotch leafminer** | Sevin (C) | 1.01-2.12 L | $15.35-$32.22 | 2 | A or G | 649 |
| | Malathion 500E (OP) | 1.11 L | $13.71 | 7 | A or G | 1375-2800 |
| | Imidan (OP) | 0.91 kg | $22.20 | 7 | G | 285 |
| | Cygon 480 (OP) | 0.22 L | $5.91 | 2 | A or G | 450 |
| | Lagon (OP) | 0.22 L | $6.23 | 2 | A or G | 60 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: P=pyrethroids, C=carbamates, OP=organophosphates

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Barley – See Small Grain Cereals

## Scouting for insects in Beans (Dry Edible Beans)

### BELOWGROUND FEEDERS

**Seedcorn Maggot**

*Typical Damage:* Seedcorn maggot attacks bean seed, preventing sprouting or weakening seedlings. The yellowish white maggot is found burrowing in the seeds or emerging stem. Seedcorn maggots are usually most severe in wet, cold seasons and on high organic matter soils.

### SAP FEEDERS

**Leafhoppers**

*Typical Damage:* Foliage becomes dwarfed, crinkled, and curled. Small triangular brown areas appear at the tips of leaves, gradually spreading around the entire leaf margin.

*Economic Threshold:* An average of one leafhopper per trifoliate leaf. Do not let infestations and damage progress to the point that yellowing of foliage is easily detected.

### DEFOLIATORS

**Grasshoppers**

*Economic Threshold:* Substantial yield loss does not occur until up to 35% defoliation occurs before bloom and 15% after bloom.

### Beans (Dry Edible) Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Wireworms** | Cruiser 350FS (N) | 143 mL/ 100 kg seed | | | Seed Treatment | |
| **Seedcorn Maggot** | Sow seeds as shallow as possible in a warm, well-prepared seedbed. If manure is used, apply and plow it under the previous fall. | | | | | |
| | Cruiser 350FS (N) | 86-143mL/ 100 kg seed | | | Seed Treatment | |
| | Agrox CD, Agrox B-2, DCT (OP) | See Seed Treatments section of Guide to Crop Protection. For control of Seedcorn maggots only | | | Seed Treatment | N/A |
| | Diazinon 50W (OP) | 20 g/300 mL water/4 L seed | - | - | Seed Treatment | 1960 |
| **Cutworms** | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| **Sap Feeders** | | | | | | |
| **Lygus Bugs** | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| | Sevin XLR (C) | 2.12-2.59 L | $32.22-$39.37 | 5 | A or G | 649 |
| | Cygon (OP) | 0.28-0.40 L | $7.52-$10.74 | 7 | A or G | 450 |
| **Potato Leafhoppers** | Cruiser 350FS (N) | 86-143mL/ 100 kg seed | | | Seed Treatment | |
| | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| | Sevin XLR Plus (C) | 1.01 L | $15.35 | 5 | A or G | 649 |
| | Malathion 500 (OP) | 0.56-1.21 L | $7.11-$15.37 | 1 | A or G | 4302 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| | Malathion 500E (OP) | 0.61-1.11 L | \$7.53-\$13.71 | 3 | A or G | 1375-2800 |
| | Diazinon 50W (OP) | 0.40 kg | \$10.24 | 7 | G | 1960 |
| | Diazinon 50 EC (OP) | 0.445 L | \$6.85 | 7 | G | NA |
| | Cygon (OP) | 0.28-0.40 L | \$7.52-\$10.74 | 7 | A or G | 450 |
| | Thionex EC (OC) | 0.6-1.0 L | \$9.75-\$16.25 | 2 | G | 110 |
| | Thiodan (OC) | 0.6-1.0 L | \$8.94-\$14.90 | 2 | G | 107.2 |
| **Aphids** | Malathion 500 (OP) | 0.56-1.21 L | \$7.11-\$15.37 | 1 | A or G | 4302 |
| | Malathion 500E (OP) | 0.61-1.11 L | \$7.53-\$13.71 | 3 | A or G | 1375-2800 |
| | Diazinon 50W (OP) | 0.40 kg | \$10.24 | 7 | G | 1960 |
| | Diazinon 500 E (OP) | 0.445 L | \$7.52 | 3 | G | 1500 |
| | Diazinon 50 EC (OP) | 0.445 L | \$6.85 | 7 | G | NA |
| | Dibrom (Dry, Field, Lima) (OP) | 0.445-0.890 L | \$14.30-\$28.59 | 4 | A or G | 345 |
| | Cygon (OP) | 0.28-0.40 L | \$7.52-\$10.74 | 7 | A or G | 450 |
| | Thionex EC (OC) | 0.6-1.0 L | \$9.75-\$16.25 | 2 | G | 110 |
| | Thiodan (OC) | 0.6-1.0 L | \$8.94-\$14.90 | 2 | G | 107.2 |
| **Defoliators and Borers** | | | | | | |
| **Grasshoppers** | **Spreadable Bran Baits** | | | | | |
| | Eco bran (C) | 0.8-1.6 kg | \$3.00-\$6.00 | 5 | G | N/A |
| **European Corn Borer** | Matador (P) | 0.034 L | \$5.07 | 14 | G | 64-110 |
| **Variegated Cutworm** | Sevin XLR Plus (C) | 30-35 mL/ 100 m of row | | 5 | A or G | 649 |
| **Alfalfa looper** | Dibrom (OP) | 0.445-0.890 L | \$14.30-\$28.59 | 4 | A or G | 345 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Scouting for insects in Canaryseed

### APHIDS

***When and How to Monitor:*** Start checking for aphids when monitoring during the early heading stage of canaryseed. The head should be bent and closely inspected for aphids hiding along the small stem inside the canaryseed head. Also check the stems, underside of leaves, and in the canaryseed boot.

***Economic Threshold:*** 10 to 20 aphids on 50% of the stems prior to the soft dough stage.

**Canaryseed Insect Management Chart**

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Sap feeders** | | | | | | |
| Aphids | Cygon 480 (OP) | 0.20 L | $5.37 | 21 | A or G | 450 |
| | Lagon 480E (OP) | 0.20 L | $5.66 | 21 | A or G | 60 |
| | Malathion 500E (canary grass- for seed) (OP) | 0.56 L | $6.92 | 14 | A or G | 1375-2800 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: OP=organophosphates

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Field Scouting in Canola

### Scouting Calendar

**Early-season:** Flea beetles, cutworms, red turnip beetle, diamondback moth

**Mid-season:** Diamondback moth, lygus bug, cabbage seedpod weevil, grasshoppers

**Late season:** Bertha armyworm, diamondback moth, Lygus bugs, grasshoppers, alfalfa looper

### Cutworms

***Typical Damage:*** Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.

***When and How to Monitor:*** Look for cutworms, and evidence of cutworm feeding, when monitoring canola in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field.

***Economic Threshold:*** none, but use 25-30% stand reduction. Sometimes it is most economical to just treat infested patches, and not whole fields.

### SAP FEEDERS:

***Typical Damage:*** Attacked buds appear shrunken and bleached white. Damaged seeds appear dark brown and shriveled.

***When and How to Monitor:*** Monitor, using an insect sweep net, from the end of flowering until seeds within the pod have become firm. Make 10 180° sweeps with a 37 cm diameter insect net at each of at least 5 sampling site. If while doing these samples populations appear to be of concern, take additional samples; a minimum of 15 samples is needed to accurately determine whether controls are economical. Sample canola for lygus bugs on a sunny day when the temperature is above 20°C and the crop canopy is dry.

***Economic Threshold:*** 10-18 lygus bugs/10 sweeps from the end of flowering to early pod development in the upper canopy and 15-25 lygus bugs/10 seeps in early pod ripening stage. Controls are not recommended when seeds are ripening (yellow or brown). When precipitation is greater than 100 mm from the onset of bud formation to the end of flowering, the crop may partially compensate for plant bug damage.

A table of specific economic thresholds for various expected values of canola seed and costs of control, as well as a sequential sampling plan for lygus bugs in canola can be found at: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex741

### Aphids

***Economic Threshold:*** Control aphids in canola if densities exceed 25 aphids/10 cm shoot tip after flowering.

## DEFOLIATORS:

### Flea beetles

***Typical Damage:*** Shot-holes in leaves complete destruction of seedling plants late May through June. Holes chewed in pods in August (occasional).

***When and How to Monitor:*** Look for when monitoring in May through June when crop is in seedling stage. Examine 10 plants at random at each stop. Estimate overall percentage leaf loss.

***Economic Threshold:*** When 25 percent of leaf surface is destroyed and flea beetles are present. If damage is only along the field margins and beetles are still congregated there, then control measures should be applied to the damaged areas only.

### Diamondback moth

***Typical Damage:*** Flowers clipped or chewed, outer layers of stem and pods chewed, holes chewed in pods.

***When and How to Monitor:*** Look for when monitoring in late-May through early September. Observing for adults and larvae while taking sweep net samples can determine the presence and relative abundance of diamondback moth in the field. If levels appear to be of concern, shake plants within a 50 cm x 50 cm area and count larvae on the ground or surface (such as a sweep net) that plants were shaken over. Another alternative is to clip or pull the plants and knock over a light colored surface (such as a sweep net, jacket, hood of a car, etc.). Multiply by 4 to get the number of larvae per square metre. Do this in at least 5 areas of the field.

***Economic Threshold:*** 100 to 150 larvae/$m^2$ in immature to flowering plants. 200 to 300 larvae/$m^2$ in plants with flowers and pods. Note that these threshold numbers are based on stands averaging 150 – 200 plants/$m^2$. In areas where stands are thinner, the economic threshold should be lowered accordingly. A nominal threshold of 25 – 33% defoliation with larvae still present can be applied for canola at seedling stage.

### Bertha Armyworm

***Typical Damage:*** Outer layers of stems and pods chewed resulting in whitish appearance, holes chewed in pods.

***When and How to Monitor:*** Look for larvae when monitoring fields in late July through early August. Sample at least 3 locations a minimum of 50 metres apart. At each stop, shake plants in a 1/4 $m^2$ area and carefully check soil surface for dislodged larvae. During heat of the day larvae will often be found under leaves on soil surface. Adult populations can be monitored in June and July using traps baited with a pheromone, which attracts the male moths. This determines the risk of a larval infestation occurring latter.

***Economic Threshold:*** A loss of 0.058 Bu/acre for each larva/$m^2$ can be expected. Multiplying 0.058 X average number of larvae per $m^2$ X expected seed value (dollars/acre) will determine the economic loss (in dollars/acre) due to the larvae. Only if control costs (insecticide plus application costs) can be applied for less than this economic loss will insecticide applications be economical.Yield loss may be greater for canola under moisture stress.

At an expected seed value of $6.00/bushel, the economic threshold will be between about 20 and 34 larvae/$m^2$, depending on control costs. At an expected seed value of $8/bushel, the economic threshold will be between about 15 and 26 larvae/$m^2$, depending on control costs. Tables showing specific economic thresholds at various expected seed values and control costs can be found at: http://www.gov.mb.ca/agriculture/crops/insects/fad03s01.html

## Canola Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Cabbage root maggot** | • **Increased seeding rates and increased row spacing** (to about 25 to 30 cm) can reduce damage to the roots by root maggots.<br>• **Cultivating** prior to seeding reduces adult emergence from overwintered pupae. Root maggot infestations are greater under zero-till systems than under conventional tillage, but yields under zero tillage usually still exceed those with conventional tillage. | | | | | |
| **Cutworms (Army, dark-sided, redbacked, pale western)** | Pounce (P) | 0.073-0.158 | $7.30-$15.00 | Treat prior to 6-leaf stage | G | 1276 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.354-0.486 L | $6.42-$8.81 | 21 | A or G | 205-418 |

| Insect | Insecticide (and insecticide group$^1$) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)$^2$ |
|---|---|---|---|---|---|---|
| **Sap Feeders** | | | | | | |
| **Lygus Bugs** | Decis 5EC (P) | 0.06 L | $5.64 | 7 | A or G | 395 |
| | Matador (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| | Lorsban/Nufos/ Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.405 L | $7.34 | 21 | A or G | 205-418 |
| | Gaucho Platinum (suppression only) (N) | 1.667L/ 100 kg of seed | N/A | Seed Treatment | Seed Treatment | N/A |
| **Turnip aphid** | Cygon 480 (OP) | 0.34-0.36 L | $9.13-$9.67 | 21 | A or G | 450 |
| | Lagon (OP) | 0.34-0.36 L | $9.62-$10.19 | 21 | A or G | 60 |
| | Gaucho Platinum (suppression only) (N) | 1.667L/ 100 kg of seed | N/A | Seed Treatment | Seed Treatment | N/A |
| **Aster leafhopper** | Cygon 480 (OP) | 0.34-0.36 L | $9.13-$9.67 | 21 | A or G | 450 |
| | Lagon (OP) | 0.34-0.36 L | $9.62-$10.19 | 21 | A or G | 60 |
| **Defoliators** | | | | | | |
| **Crucifer Flea beetle and/or striped flea beetle** | **Seed Treatments** | | | | | |
| | Helix (N) | 1500 ml/ 100 kg of seed | N/A | Seed Treatment | Seed Treatment | >5,000 |
| | Helix Xtra (N) | 1500 ml / 100 kg of seed | N/A | Seed Treatment | Seed Treatment | >5,000 |
| | Gaucho Canola System (N) | 0.833 L/ 100 kg of seed | N/A | Seed Treatment | Seed Treatment | N/A |
| | Gaucho Platinum (N) | 1.667L/ 100 kg of seed | N/A | Seed Treatment | Seed Treatment | N/A |
| | Prosper (N) | — | N/A | Seed Treatment | Seed Treatment | N/A |
| | **Foliar Sprays** | | | | | |
| | Decis Flowable (P) | 0.04-0.06 L | $4.65-$6.98 | 7 | A or G | 15000 |
| | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| | Ripcord (P) | 0.02 L | $2.47 | 30 | G | 242-542 |
| | Matador (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| | Sevin XLR Plus (C) | 0.2 L | $3.04 | Seedling application only | A or G | 649 |
| | Furadan (C) | 0.06 L | $2.28 | 60 | A or G | 7.34 |
| | Malathion 500 (OP) | 0.44 L | $5.59 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.45-0.71 L | $5.56-$8.77 | 7 | A or G | 1375-2800 |
| **Red Turnip beetle** | Furadan (C) | 0.11 L | $4.18 | 60 | A or G | 7.34 |
| **Cabbage seedpod weevil** | Gaucho Platinum (suppression of larvae only) (N) | 1.667L/ 100 kg of seed | N/A | Seed Treatment | Seed Treatment | N/A |
| | Matador (adults) (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| | Decis 5EC (for control of adults only) (P) | 0.08 | $7.52 | 7 | A or G | 395 |
| **Diamondback moth** | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| | Matador (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| | Malathion 500 (OP) | 0.22-0.34 L | $2.79-$4.32 | 7 | A or G | 4302 |
| | Malathion 500E (larvae only) (OP) | 0.22-0.34 L | $2.72-$4.20 | 7 | A or G | 1375-2800 |
| | Lorsban/Nufos/ Pyrinex/ Chlorpyrifos 480 EC (for larval control only) (OP) | 0.405 L | $7.34 | 21 | A or G | 205-418 |
| **Bertha Armyworm** | **Seeding as early as possible** and choosing **early maturing varieties of canola** may help minimize damage in years when outbreaks are forecasted. | | | | | |
| | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| | Ripcord (P) | 0.028 L (ground)<br>0.036 L (air) | $3.46 (ground)<br>-$4.45 (air) | 30 | A or G | 242-542 |
| | Matador (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| | Lannate (C) | 0.0874-0.2064 kg | $6.80-$16.06 | 8 | A or G | 30-34 |
| | Lorsban/Nufos/ Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.304-0.405 L | $5.51-$7.34 | 21 | A or G | 205-418 |
| | Monitor (OP) | 0.23-0.5 L | $6.61-$14.38 | 10 | A or G | 17 |
| **Alfalfa looper** | Lannate (OP) | 0.087-0.206 kg | $6.80-$16.06 | 8 | A or G | 30-34 |
| | Lorsban/Nufos/ Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.304-0.405 L | $5.51-$7.34 | 21 | A or G | 272/205/418 |
| **Beet webworm** | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| | Lannate (C) | 0.0874-0.2064 kg | $6.80-$16.06 | 8 | A or G | 30-34 |
| **Clover cutworm** | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| | Lannate (C) | 0.0874-0.2064 kg | $6.80-$16.06 | 8 | A or G | 30-34 |
| **True armyworm** | Lorsban/Nufos/ Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.304-0.405 L | $5.51-$7.34 | 21 | A or G | 205-418 |
| **Imported Cabbageworm** | Matador (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| **Variegated cutworm** | Lorsban/Nufos/ Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.354-0.486 | $6.42-$8.81 | 21 | A or G | 205-418 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| Grasshoppers | **Spreadable Bran Baits** | | | | | |
| | Eco bran (C) | 0.8-1.6 kg | \$3.00-\$6.00 | Treat only seedlings | G | N/A |
| | **Sprays** | | | | | |
| | Decis 5EC (P) | 0.04-0.06 L (Ground);<br>0.06 L (Aerial) | \$3.76-\$5.64 | 7 | A or G | 395 |
| | Matador (young grasshoppers only) (P) | 0.025-0.034 L (Ground)<br>0.034 L (Aerial) | \$3.87-\$5.07<br>\$5.07 | 7 | A or G | 64-110 |
| | Ripcord (young grasshoppers only) (P) | 0.02-0.028 L | \$2.47-\$3.46 | 30 | G | 242-542 |
| | Malathion 500 (OP) | 0.45-0.69 L | \$5.59-\$8.64 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.45-0.71 L | \$5.56-\$8.77 | 7 | A or G | 1375-2800 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.235-0.354 L | \$4.26-\$6.42 | 21 | A or G | 205-418 |
| | Cygon 480 (OP) | 0.34-0.36 L | \$9.13-\$9.67 | 21 | A or G | 450 |
| | Lagon (OP) | 0.34-0.36 L | \$9.62-\$10.19 | 21 | A or G | 60 |
| | Monitor (OP) | 0.5 L | \$14.38 | 10 | A or G | 17 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: N=Neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Chickpeas Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Cutworms** | | | | | | |
| Cutworms | Matador (P) | 0.034 L | \$5.07 | 14 | G | 64-110 |
| **Sap Feeders** | | | | | | |
| Potato Leafhopper | Matador (P) | 0.034 L | \$5.07 | 14 | G | 64-110 |
| **Defoliators** | | | | | | |
| Grasshoppers | Matador (P) | 0.034 L | \$5.07 | 14 | G | 64-110 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: P=pyrethroids

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Field Scouting in Corn (Field Corn)

### Cutworms

***Typical Damage:*** Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in filed.

***When and How to Monitor:*** Look for cutworms, and evidence of cutworm feeding, when monitoring corn in late-May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. At each stop, examine 100 plants in a row. Calculate percentage of plants cut off or showing leaf feeding.

***Economic Threshold:*** When 3% of plants are cut. Sometimes it is most economical to just treat infested patches, and not whole fields.

### European corn borer

***Typical Damage:*** Shot-holes in leaves. Holes in stalk, tassels and ears. Damage may cause stalk breakage prior to harvest or cobs to fall to the ground. Nutrient flow in the plant may be restricted, resulting in smaller cobs.

***When and How to Monitor:*** Begin looking for European corn borer when field scouting in early July. At 5 locations, examine 10 plants for young larvae and egg masses. Calculate percentage of plants infested. Scout every 5 to 7 days until the end of July or larvae start to tunnel into the stalks.

***Economic Threshold:*** The level of European corn borer where control becomes economical depends on the value of the crop, and cost of control. Information on determining specific economic thresholds for European corn borer in corn can be found at http://www.gov.mb.ca/agriculture/crops/insects/fad46s00.html, or from your local agriculture office. These thresholds are based on a 5% yield loss per corn borer per plant on average. If the majority of larvae have bored into the stalk, do not apply insecticide, as they are ineffective once the larvae have entered the stalk.

## Corn (Field Corn) Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Cutworms** | Matador (P) | 0.034 L | $5.07 | 1 (sweet corn)<br>14 (silage) | A or G | 64-110 |
| | Ripcord (black, white, darksided, redbacked, army, pale western) (P) | 0.07 L | $8.65 | 21 | G | 242-542 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (dark sided, black, redbacked) (OP) | 0.971 L (Pre-plant treatment),<br>0.486-0.971 L (seedling treatment) | Pre-plant treatment- $17.60;<br>Seedling treatment- $8.81-$17.60 | 70 | G | 205-418 |
| **Wireworms** | Cruiser 350FS (N) | 143 mL/ 100 kg seed | | Seed Treatment | Seed Treatment | |
| | Poncho 250 (N) | 0.25 mg of Poncho 600 per kernel | | Seed Treatment | Seed Treatment | 500-1,000 |
| **Seedcorn maggot** | Cruiser 5FS (N) | 83-166mL/ 100 kg seed | | Seed Treatment | Seed Treatment | |
| | Agrox CD (OP) | 0.05 kg/25 kg of seed | | Seed Treatment | Seed Treatment | N/A |
| | Agrox B-2 (OP) | See label | | Seed Treatment | Seed Treatment | N/A |
| | Diazinon 50W (OP) | 0.020 kg/ 300 mL water/ 4L of seed | $0.40/4 L of seed | Seed Treatment | G | 1960 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Sap Feeders** | | | | | | |
| **Corn leaf aphid** | Thiodan / Thionex EC (OC) | 1.11 L | $16.54-$18.04 | 50 | G | 110 |
| **Defoliators and Borers** | | | | | | |
| **Grasshoppers** | **Spreadable Bran Baits** | | | | | |
| | Eco bran (C) | 0.8-1.6 kg | $3.00-$6.00 | 1 | G | N/A |
| | **Sprays** | | | | | |
| | Sevin XLR Plus (C) | 0.50-1.01 L | $7.60-$15.35 | 1 | A or G | 649 |
| **European Corn Borer** | Cultivars of **Bt corn** are resistant to feeding by European corn borer. If using cultivars of Bt corn, a refuge of at least 20% of the corn acres planted to non-Bt cultivars should be planted to reduce the odds of European corn borer developing resistance to Bt corn. | | | | | |
| | Dipel 2X DF (M) | 0.23-0.45 kg | $20.24-$39.60 | 0 | G | >4,000 |
| | Matador (P) | 0.034 L | $5.07 | 14 | A or G | 64-110 |
| | Decis 5EC (P) | 0.1-0.12 L | $9.40-$11.28 | See product label | G | 395 |
| | Ripcord (P) | 0.07 L | $8.65 | 5 | A or G | 242-542 |
| | Sevin XLR Plus (C) | 1.01-1.6 L | $15.35-$24.32 | 1 | A or G | 649 |
| | Furadan (C) | 0.445 L | $16.91 | 7 | A or G, see guide | 7.34 |
| | Malathion 500E (OP) | 0.91-1.11 L | $11.24-$13.71 | 5 | A or G | 1375-2800 |
| **Corn Earworm** | Matador (P) | 0.034 L | $5.07 | 14 | A or G | 64-110 |
| | Ripcord (P) | 0.07 L | $8.65 | 5 | A or G,<br>see product label | 242-542 |
| | Sevin XLR Plus (C) | 1.01-1.6 L | $15.35-$24.32 | 1 | A or G | 649 |
| | Malathion 500E (OP) | 0.91-1.11 L | $11.24-$13.71 | 5 | A or G | 1375-2800 |
| | Thionex EC (OC) | 1.11-1.62 L | $18.04-$26.33 | 50 | G | 110 |
| | Thiodan (OC) | 1.11-1.72 L | $16.54-$25.63 | 50 | G | N/A |
| **Fall armyworm** | Sevin XLR (C) | 1.01-1.6 L | $15.35-$24.32 | 1 | A or G | 649 |
| | Matador (P) | 0.034 L | $5.07 | 14 | A or G | 64-110 |
| | Pounce (P) | 0.073 L | $7.30 | 1 | G | 1030 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

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[1] Insecticide Group: M=microbials, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Fababean Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Sap Feeders** | | | | | | |
| Lygus Bugs | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| Potato Leafhopper | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| Pea Aphid | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: P=pyrethroids

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Field Scouting in Flax

### Cutworms

***Typical Damage:*** Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.

***When and How to Monitor:*** Look for cutworms, and evidence of cutworm feeding, when monitoring in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of the field where cutworm damage is noticeable, check around damaged plants in a 0.25 m$^2$ (50cm x 50cm) areas. Use trowel or shovel to carefully search through top 5 cm of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per m2. Repeat in several locations to get an accurate assessment of what cutworm levels are.

***Economic Threshold:*** 4 – 5 larvae/m$^2$. Sometimes it is most economical to just treat infested patches, and not whole fields.

### Aphids

***Typical Damage:*** Extract plant fluids from the stems, leaves and developing bolls. Can cause fewer seeds to be produced.

***When and How to Monitor:*** The easiest way to detect aphids in flax is to sample the upper portions of the plant with an insect sweep net when the crop is in full bloom, or tap plants over a white tray or bucket. If aphids are found, fields need to be more closely inspected by randomly sampling plants. To inspect plants, lightly tap the plants on a white surface, such as a tray or the canvas of a sweep net, to dislodge the insects. Plants can be severed at the base prior to tapping if desired. Inspect a minimum of 25 plants at full bloom and 20 plants at early green boll randomly in the field to provide an accurate estimate of aphid density. Additional plants may need to be sampled if aphid levels are close to the economic threshold (see sequential sampling tables for aphids in flax at http://www.gov.mb.ca/agriculture/crops/insects/fad97s00.html). Record total number of aphids and calculate average per plant.

If control is not warranted at full bloom, aphid densities should be assessed again at the green boll stage.

***Economic Threshold:*** Three aphids per main stem at full bloom or 8 aphids per main stem at the green boll stage. See the sequential sampling tables listed above for more specific economic thresholds.

The yield loss of flax is 0.021 t/ha per aphid per plant for crops sampled at full bloom and 0.008 t/ha per aphid per plant for crops sampled at the green boll stage.

The potato aphid is highly susceptible to attack by fungi (especially in years of high rainfall and humidity in late June and July). Aphid populations sampled at full bloom that have many diseased insects should be sampled again at the early green boll stage to determine the effect of the disease on aphid densities.

### Beet webworm

***Economic Threshold:*** >10 larvae/m$^2$

## Flax Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Wireworm** | No insecticides registered for the control of wireworms in flax | | | | | |
| **Cutworms (Army, dark-sided, redbacked, pale western)** | Decis 5EC (P) | 0.08 L | $7.52 | 40 | A or G | 395 |
| | Pounce (P) | 0.073-0.158 L | $7.30-$15.00 | Treat prior to 6 leaf stage | G | 1030 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.354-0.486 L | $6.42-$8.81 | 21 | A or G | 205-418 |
| **Sap Feeders** | | | | | | |
| **Potato Aphid** | Cygon 480 (OP) | 0.18 L | $4.83 | 21 | A or G | 450 |
| | Lagon (OP) | 0.18 L | $5.09 | 21 | A or G | 60 |
| **Defoliators** | | | | | | |
| **Grasshoppers** | Decis Flowable (P) | 0.032-0.048 L | $3.72-$5.58 | 40 | A or G | 15,000 |
| | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 40 | A or G | 395 |
| | Matador (young grasshoppers only) (P) | 0.025-0.034 L (Ground)<br>0.034 L (Aerial) | $3.88-$5.07<br>$5.07 | 7 | A or G | 64-110 |
| | Malathion 500 (OP) | 0.44-0.68 L | $5.59-$8.64 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.45-0.71 L | $5.56-$8.77 | 7 | A or G | 1375-2800 |
| **Bertha Armyworm** | Lannate (C) | 0.089-0.109 kg | $6.92-$8.50 | 8 | A or G | 30-34 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.304-0.405 L | $5.51-$7.34 | 21 | A or G | 205-418 |
| **True Armyworm** | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.354-0.486 L | $6.42-$8.81 | 21 | A or G | 205-418 |
| **Clover Cutworm** | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 40 | A or G | 395 |
| **Variegated cutworm** | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.354-0.486 L | $6.41-$8.81 | 21 | A or G | 205-418 |
| **Beet Webworm** | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 40 | A or G | 395 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Forage Grasses (Timothy, etc.) Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Defoliators** | | | | | | |
| **Grasshoppers** | **Spreadable Bran Baits** | | | | | |
| | Eco bran (C) | 0.8-1.6 kg | \$3.00-\$6.00 | 1-2 | G | N/A |
| | **Sprays** | | | | | |
| | Sevin XLR Plus (C) | 0.49-0.93 L (for nymphs or sparse vegetation)<br>0.93-1.42 L (for adults or application to dense vegetation) | \$7.30-\$14.14<br>\$14.14-\$21.43 | 1 | A or G | 649 |
| | Malathion 500 (OP) | 0.69 L | \$8.64 | 7 | A or G | 4302 |
| | Cygon (OP) | 0.17 L (young)<br>0.34 L (adult) | \$4.56<br>\$9.13 | 2<br>7 | A or G | 450 |
| | Lagon (OP) | 0.17-0.22 L | \$4.81-\$6.23 | 2 | A or G | 60 |
| **European skipper (on timothy)** | Dipel 2X DF (M) | 57-111 g | \$4.99-\$9.79 | N/A | A or G | >4,000 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: M=microbials, C=carbamates, OP=organophosphates

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Field Scouting in Lentils

### Grasshoppers

***When and How to Monitor:*** Look for when monitoring fields from the early bud stage through pod development.

***Economic Threshold:*** 2 grasshoppers/m$^2$ during the flowering and podding stages, especially if two-striped grasshopper is the dominant species.

### Lygus Bugs

***When and How to Monitor:*** Look for adult lygus bugs when monitoring lentils during blooming and podding by using a sweep net, making 25 180° sweeps in at least 5 randomly selected places in a field.

***Economic Threshold:*** Insecticide treatment is recommended when 7-10 adults are collected per 25 sweeps.

### Pea aphid

***Economic Threshold:*** 30-40 aphids per 180° sweep of a 38 cm (15 inch) diameter insect net, and few natural enemies are present, and when aphid numbers do not decline over a 2-day period.

## Lentil Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground feeders and Cutworms** | | | | | | |
| **Cutworms** (Army, black, dark-sided, pale western, redbacked, white) | Decis 5EC (P) | 0.08 L | $7.52 | 30 | A or G | 395 |
| | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| | Pounce (P) | 0.073-0.158 L | $7.30-$15.00 | Treat prior to 6-leaf stage | G | 1030 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (for pale western cutworm only) (OP) | 0.354-0.486 L | $6.42-$8.81 | 21 – 60 | A or G | 205-418 |
| **Sap Feeders** | | | | | | |
| **Lygus Bugs** | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| **Potato Leafhopper** | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| **Pea Aphid** | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| **Defoliators** | | | | | | |
| **Grasshoppers** | Decis Flowable (P) | 0.032-0.048 L (ground)<br>0.048 L (air) | $3.72-$5.58 | 30 | A or G | 15000 |
| | Decis 5EC (P) | 0.04-0.06 L (ground)<br>0.06 L (air) | $3.76-$5.64 | 30 | A or G | 395 |
| | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| | Malathion 500 (OP) | 0.68 L | $8.64 | 30 | A or G | 4302 |
| | Malathion 500E (OP) | 0.69 L | $8.52 | 14 | A or G | 1375-2800 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.235-0.486 L | $4.26-$8.81 | 21-60 | A or G | 205-418 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: P=pyrethroids, OP=organophosphates

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Mustard Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders** | | | | | | |
| **Root Maggot** | No insecticides registered | | | | | |
| **Sap Feeders** | | | | | | |
| **Lygus Bugs** | Decis 5EC (P) | 0.06 L | $5.52 | 7 | A or G | 395 |
| **Defoliators** | | | | | | |
| **Flea beetles** | **Seed Treatments** | | | | | |
| | Helix (N) | 1500 ml/ 100 kg of seed | N/A | N/A | Seed Treatment | >5,000 |
| | Helix Xtra (N) | 1500 ml/ 100 kg of seed | N/A | N/A | Seed Treatment | >5,000 |
| | Gaucho Canola System (N) | 0.833 L/ 100 kg of seed | N/A | N/A | Seed Treatment | N/A |
| | Gaucho Platinum (N) | 1.667 L/ 100 kg of seed | N/A | N/A | Seed Treatment | N/A |
| | **Sprays** | | | | | |
| | Decis Flowable (P) | 0.04-0.06 L | $4.65-$6.98 | 7 | A or G | 15,000 |
| | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| | Matador (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| | Furadan 480F (C) | 0.06 L | $2.28 | 21 | A or G | 7.34 |
| | Malathion 500E (OP) | 0.45-0.71 L | $5.56-$8.77 | 7 | A or G | 1375-2800 |
| **Red Turnip Beetle** | Furadan 480F (C) | 0.11 L | $4.18 | 21 | A or G | 7.34 |
| **Cabbage seedpod weevil** | Note: Yellow mustard (*Sinapis alba*) is resistant to cabbage seedpod weevil; oriental and brown mustards (*Brassica juncea*) are susceptible to feeding by cabbage seedpod weevil. | | | | | |
| | Matador (adults) (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| | Decis 5 EC (for control of adults only) (P) | 0.08 L | $7.52 | 7 | A or G | 395 |
| **Diamondback Moth** | Decis 5 EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| | Matador (adults) (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| | Malathion 500E (OP) | 0.22-0.34 L | $2.72-$4.20 | 7 | A or G | 1375-2800 |
| **Bertha Armyworm** | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| | Matador (P) | 0.034 L | $5.07 | 7 | A or G | 64-110 |
| **Clover Cutworm** | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| **Beet webworm** | Decis 5EC (P) | 0.04-0.06 L | $3.76-$5.64 | 7 | A or G | 395 |
| **Grasshopper** | Matador (young grasshoppers only) (P) | 0.025-0.034 L (Ground)<br>0.034 L (Aerial) | $3.87-$5.07<br>$5.07 | 7 | A or G | 64-110 |
| | Malathion 500E (OP) | 0.45-0.71 L | $5.56-$8.77 | 7 | A or G | 1375-2800 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: N= neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Oats – See small grain cereals

## Grasshopper Management on Pastures, Rangelands, Hay, Headlands, and Roadsides

**Note:** Insects for biological control of weeds such as leafy spurge may be introduced and established in some areas of Manitoba and Saskatchewan. If grasshopper numbers become high, consider using control strategies and insecticides that will minimize harm to these biological control agents.

| Insecticide and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|
| Grasshoppers on rangelands may be effectively managed by applying certain insecticides in 30 metre swaths, alternating with 30 metre untreated swaths. For more information on managing grasshoppers by this method see: http://www.sdvc.uwyo.edu/grasshopper/raats.htm | | | | | |
| **Spreadable Bran Baits** | | | | | |
| Eco bran (pastures, rangelands, field borders, headlands, right-of-way, roadsides, wastelands) (C) | 0.8-1.6 kg | \$3.00-\$6.00 | 0-2 (see label) | G | N/A |
| **Sprays** | | | | | |
| Decis Flowable (Rangeland, pastures, roadsides) (P)) | 0.032-0.048 | \$3.72-\$5.58 | 1 (beef cattle) Dairy cattle must not be fed or grazed on Decis-treated crops | A or G | 15,000 |
| Decis 5EC (Rangeland, pastures, roadside, fence row) (P) | 0.04-0.06 L | \$3.76-\$5.64 | 1 (beef cattle) Dairy cattle must not be fed or grazed on Decis 5EC treated crops. | A or G | 395 |
| Ripcord (Roadsides, headlands, and summerfallow) (young grasshoppers only) (P) | 0.02-0.028 L | \$2.47-\$3.46 | Treated areas must not be grazed or cut or hay. | G | 242-542 |
| Matador (Unimproved pasture, summerfallow ) (young grasshoppers only) (P) | 0.026-0.034 L (ground)<br>0.034 L (Aerial) | \$3.88-\$5.07<br>\$5.07 | 14 | A or G | 64-110 |
| Sevin XLR plus (ditchbanks, field borders, headlands, pastures, rangelands, right-of-way, wastelands) (C) | 0.48-1.41 L | \$7.30-\$21.43 | 0 (ditchbanks, field borders, headlands, right-of-way, wasteland);<br>1 (pastures, rangeland) | A or G | 649 |
| Malathion 500 (Hay only) (OP) | 0.69 L | \$8.64 | 7 | A or G | 4302 |
| Malathion 500E (pastures, rangelands) (young grasshoppers only) (OP) | 0.69 L | \$8.52 | Do not apply to fields occupied by dairy animals, but may be grazed or harvested on the day of application. | A or G | 1375-2800 |

| Insecticide and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|
| Diazinon (Rangeland, pasture, ditch banks, roadsides, fence rows, wasteland) (OP) | 0.445 L (Diazinon 500E and 50 EC)<br>0.445 kg (Diazinon 50W) | $7.52 (500 E)<br>$6.85 (50 EC)<br>$11.39 (50W) | Do not spray livestock directly. Dairy and Beef cattle and sheep may be grazed or fed green forage immediately following application. Hay may be fed if not cut for 21 days following application. | G | 1500 (500 E)<br>1960 (50W) |
| Dibrom (Rangeland, pastures, dairy and horse paddocks) (OP) | 0.22-0.34 L (young grasshoppers)<br>0.28-0.4 L (adult grasshoppers) | $7.15-$11.05 (young)<br>$9.10-$13.00 (adult) | 4 | A or G | 345 |
| Lagon 480E (pasture, wasteland) (OP) | 0.22 L (nymphs)<br>0.34-0.40 L (adults) | $6.23<br>$9.62-$11.32 | 2 days-0.22L rate<br>7 days-0.34L rate<br>28 days-0.40L rate | A or G | 60 |
| Hay | 0.17-0.22 L | $4.81-$6.23 | 2 | | |
| Cygon 4E (pasture, wasteland) (OP) | 0.17 L (young)<br>0.34 L (adults) | $4.56<br>$9.13 | 2-7 | A or G | 450 |
| Cygon 480 (pasture, wasteland) (OP) | 0.22 L (young)<br>0.34-0.40 L (adults) | $5.91<br>$9.13-$10.74 | 2-28 | A or G | 450 |
| Lorsban/Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | Ungrazed and unoccupied areas such as roadsides, right of way, and fence lines adjacent to barley, wheat, oats, or canola, and lentils. | | | A or G | 205- 418 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: P=pyrethroids, C=carbamates, OP=organophosphates

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Field Scouting in Peas (Field Peas)

### SAP FEEDERS

**Aphids**

***When and How to Monitor:*** Look for when monitoring field peas at the beginning of flowering. Take 180° sweeps or check 10 8-inch (20 cm) plant tips at each stop. Record total number of aphids and calculate average per sweep or plant tip.

***Economic Threshold:*** If, at the beginning of flowering, there are 9 to 12 aphids per sweep or 2-3 aphids per 8-inch (20 cm) plant tip, an insecticide application when 50 percent of plants have produced some young pods will be cost-effective.

**Peas (Field Peas) Insect Management Chart**

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders** | | | | | | |
| **Wireworm** | No insecticides registered for the control of wireworms in peas | | | | | |
| **Seedcorn Maggot** | Diazinon 50W (OP) | 20g/300ml water/4L seed | $0.51 to treat 4L of seed | Seed Treatment | Seed Treatment | 1960 |
| | Agrox CD (OP) | | | Seed Treatment | Seed Treatment | N/A |
| | Agrox B-2 (OP) | | | Seed Treatment | Seed Treatment | N/A |
| **Cutworms (Army, black, dark-sided, pale western, redbacked, white)** | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| | Pounce (P) | 0.073-0.158 L | $7.30-$15.00 | Treat prior to 6 leaf stage | G | 1030 |
| **Sap Feeders** | | | | | | |
| **Leafhoppers** | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| | Malathion 500E (OP) | 0.91 L | $11.24 | 3 | A or G | 1375-2800 |
| **Pea Aphid** | Matador (P) | 0.034 L | $5.07 | 14 | G | 64-110 |
| | Lannate (C) | 0.206 kg | $16.06 | 1 | G | 30-34 |
| | Malathion 500E (OP) | 0.91 L | $11.24 | 3 | A or G | 1375-2800 |
| | Lagon (OP) | 0.11-0.17 L | $3.11-$4.81 | 3 | A or G | 60 |
| **Spider mites** | Malathion 500E (OP) | 0.91 L | $11.24 | 3 | A or G | 1375-2800 |
| **Defoliator** | | | | | | |
| **Alfalfa Looper** | Sevin (C) | 1.90 L | $28.88 | 3 | G | 649 |
| | Lannate (C) | 0.206 kg | $16.06 | 1 | G | 30-34 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

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[1] Insecticide Group: P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Potatoes* Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Wireworms** | Thimet (OP) | 0.14 kg in sandy soils 0.215 kg in heavy soils | $0.85-$1.31/ 100m row | At planting application. Do not harvest before 90 days after planting time. | G | 27-31 |
| **Cutworms (Army, darksided, pale western, redbacked, black, white)** | Pounce (P) | 0.073-0.158 L | $7.30-$15.00 | Treat prior to 6-leaf stage | G | 1276 |
| | Ripcord (P) | 0.07 L | $8.65 | 21 | G | 242-542 |
| | Pyrinex/ Nufos/Lorsban/ Chlorpyrifos 480 EC (Redbacked, black, and darksided cutworms only) (OP) | 0.971 L (pre-plant) 0.486-0.971 L (seedling) | $17.60 (pre-plant) $8.81-$17.60 (seedling treatment) | 7 | G | 205-418 |
| **Sap Feeders** | | | | | | |
| **Aphids** | Fulfill (FD) | 78.1 g | $19.53 | 14 | G | >5,000 |
| | Genesis (N) | 11.79-17.69 ml per 100 pounds (45.36 kg) of potato seed tubers | $3.05-$4.58/ 100 pounds of potato seed tubers | NA | Seed Treatment | >4,870 |
| | Admire 240 F (N) | Soil Application: 0.344-0.526 L (based on 90 cm row spacing). Foliar Application: 0.081 L | Soil Application: $88.98-$136.05 Foliar Application: $20.69 | 7 (foliar application) | G | 4143-4870 |
| | Assail (N) | 22.7-34.8 g | $13.39-$20.53 | 7 | G | 1,064 |
| | Lannate (C) | 0.2185 kg | $16.99 | 3 | G | 30-34 |
| | Malathion 500 (OP) | 056-0.80 L | $7.11-$10.16 | 3 | Aor G | 4302 |
| | Malathion 500E (OP) | 0.61-0.91 L | $7.53-$11.24 | 3 | A or G | 1375-2800 |
| | Diazinon 50 W (OP) | 0.445 kg | $11.39 | 14 | G | 1960 |
| | Diazinon 500E (OP) | 0.445 L | $7.52 | 14 | G | 1500 |
| | Diazinon 50 EC (OP) | 0.445 L | $6.85 | 14 | G | NA |
| | Cygon (OP) | 0.22-0.44 L | $5.91-$11.81 | 7 | G | 450 |
| | Lagon (OP) | 0.22-0.44 L | $6.23–12.45 | 7 | G | 60 |
| | Thimet (OP) | 0.14 kg in sandy soils 0.215 kg in heavy soils | $0.85-$1.31/ 100m row | 90 | G | 27-31 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| | Monitor (OP) | 0.71-0.91 L | $20.41-$26.16 | 14 | A or G | 17 |
| | Imidan (OP) | 0.91 kg | $22.20 | 7 | G | 285 |
| | Orthene (OP) | 0.30-0.44 kg | $16.63-$24.39 | 21 | G | 1030-1447 |
| | Vydate (OP) | 0.93-1.21 L | $16.04-$20.87 | 7 | G | 9-10 |
| | Thionex 50W (OC) | 0.45-0.61 kg | $11.16-$15.13 | 1 | G | 110 |
| | Thionex EC (OC) | 0.6-0.8 L | $9.75-$13.00 | 2 | G | 110 |
| | Thiodan (OC) | 0.6-0.8 L | $8.94-$11.92 | 1 | G | 107.2 |
| **Leafhoppers** | Genesis (N) | 11.79-17.69 ml per 100 pounds (45.36 kg) of potato seed tubers | $3.05-$4.58/ 100 pounds of potato seed tubers | NA | Seed Treatment | >4,870 |
| | Admire 240F (N) | Soil Application: 0.344-0.526 L (based on 90 cm row spacing). | $88.98-$136.05 | NA | G | 4143-4870 |
| | Pounce (P) | 0.075-0.10 L | $7.30-$10.00 | 1 | G | 1276 |
| | Decis 5EC (P) | 0.04 –0.06 L | $3.76-$5.64 | 3 | A or G | 395 |
| | Matador (P) | 0.034-0.050 L | $5.07-$7.46 | 7 | A or G | 64-110 |
| | Ripcord (P) | 0.025-0.05 L | $3.09-$6.18 | 7 | A or G | 242-542 |
| | Sevin (C) | 0.50 L | $7.60 | 7 | A or G | 649 |
| | Furadan (C) | 0.445 L | $16.91 | 7 | G | 7.34 |
| | Lannate (C) | 0.2185 kg | $17.00 | 3 | G | 30-34 |
| | Malathion 500 (OP) | 056-0.80 L | $7.11-$10.16 | 3 | A or G | 1375-2800 |
| | Malathion 500E (OP) | 0.61-0.91 L | $7.53-$11.24 | 3 | A or G | 1375-2800 |
| | Diazinon 50 W (OP) | 0.445 Kg | $11.39 | 14 | G | 1960 |
| | Diazinon 500E (OP) | 0.445 L | $7.52 | 14 | G | 1500 |
| | Diazinon 50 EC (OP) | 0.445 L | $6.85 | 14 | G | NA |
| | Cygon (OP) | 0.22-0.44 L | $5.91-$11.81 | 7 | G | 450 |
| | Lagon (OP) | 0.22-0.44 L | $6.23-$12.45 | 7 | G | 60 |
| | Thimet (OP) | 0.14 kg in sandy soils<br>0.215 kg in heavy soils | $0.85-$1.31/ 100m row | 90 | G | 27-31 |
| | Monitor (OP) | 0.71-0.91 L | $20.41-$26.16 | 14 | A or G | 17 |
| | Dibrom (OP) | 0.44 L | $14.30 | 4 | A or G | 345 |
| | Imidan (OP) | 0.91 kg | $22.20 | 7 | G | 285 |
| | Orthene (OP) | 0.30-0.44 kg | $16.63-$24.39 | 21 | G | 1030-1447 |
| | Vydate (OP) | 0.93-1.21 L | $16.04-$20.87 | 7 | G | 9-10 |
| | Thionex 50W (OC) | 0.45-0.61 kg | $11.16-$15.13 | 1 | G | 110 |
| | Thionex EC (OC) | 0.6-0.8 L | $9.75-$13.00 | 2 | G | 110 |
| | Thiodan (OC) | 0.6-0.8 L | $8.94-$11.92 | 1 | G | 107.2 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Lygus bugs** | Pounce (P) | 0.075-0.10 L | $7.30-$10.00 | 1 | G | 1276 |
| | Decis 5EC (P) | 0.04 –0.06 L | $3.76-$5.64 | 3 | A or G | 395 |
| | Matador (P) | 0.034-0.050 L | $5.07-$7.46 | 7 | A or G | 64-110 |
| | Ripcord (P) | 0.05 L | $6.18 | 7 | A or G | 242-542 |
| | Sevin (C) | 2.12-2.59 L | $32.22-$39.37 | 7 | A or G | 649 |
| | Furadan (C) | 0.445 L | $16.91 | 7 | G | 7.34 |
| | Lagon (OP) | 0.22-0.44 L | $6.23-$12.45 | 7 | G | 60 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (larvae only) (OP) | 0.405 L | $7.34 | 7 | G | 205-418 |
| | Orthene (OP) | 0.30-0.44 kg | $16.23-$24.39 | 21 | G | 1030-1447 |
| | Vydate (OP) | 0.93-1.21 L | $16.04-$20.87 | 7 | G | 9-10 |
| | Thionex 50W (OC) | 0.45-0.61 kg | $11.16-$15.13 | 1 | G | 110 |
| | Thionex EC (OC) | 0.6-0.8 L | $9.75-$13.00 | 1 | G | 110 |
| | Thiodan (OC) | 0.6-0.8 L | $8.94-$11.92 | 1 | G | 107.2 |
| **Defoliators** | | | | | | |
| **Colorado potato beetle** | Note: Colorado potato beetles have been found to be resistant to several families of insecticides in localized areas of Manitoba. Rotation between different families of insecticides is essential. | | | | | |
| | Entrust (S) | 20-40 g/acre | | 7 | G | |
| | Success (S) | 0.034-0.067 L | $15.97-$31.48 | 7 | G | >5,000 |
| | Novodor FC (M) | 4.0-8.0 L | $58.20-$116.40 | 1 | G | 74, 000 |
| | Genesis (N) | 11.79-17.69 ml per 100 pounds (45.36 kg) of potato seed tubers | $3.05-$4.58/ 100 pounds of potato seed tubers | NA | Seed Treatment | >4,870 |
| | Admire (N) | In furrow: 0.345 -0.525 L<br>Foliar: 0.080 L | In furrow: $88.98-$136.05<br>Foliar: $20.69 | 7 | G | 4143-4870 |
| | Assail (N) | 16.2-32.4 g | $9.56-$19.12 | 7 | G | 1,064 |
| | Pounce (P) | 0.075 -0.10 L | $7.30-$10.00 | | | |
| | Decis 5EC (P) | 0.04 -0.06 L | $3.76-$5.64 | 3 | A or G | 395 |
| | Matador (P) | 0.034-0.050 L | $5.07-$7.46 | 7 | A or G | 64-110 |
| | Ripcord (P) | 0.025-0.05 L | $3.09-$6.18 | 7 | A or G | 242-542 |
| | Sevin (C) | 0.50 L | $7.60 | 7 | A or G | 649 |
| | Furadan (C) | 0.222 L | $8.44 | 7 | G | 7.34 |
| | Malathion 500 (OP) | 056-0.80 L | $7.11-$10.16 | 3 | A or G | 4302 |
| | Malathion 500E (OP) | 0.61-0.91 L | $7.53-$11.24 | 3 | A or G | 1375-2800 |
| | Diazinon 50 W (OP) | 0.445 kg | $11.39 | 14 | G | 1960 |
| | Diazinon 500E (OP) | 0.445 L | $5.52 | 14 | G | 1500 |
| | Diazinon 50 EC (OP) | 0.445 L | $6.85 | 14 | G | NA |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| | Thimet (OP) | 0.14 kg in sandy soils<br>0.215 kg in heavy soils | $0.85-$1.31/ 100m row | 90 | G | 27-31 |
| | Monitor (OP) | 0.71-0.91 L | $20.41-$26.16 | 14 | A or G | 17 |
| | Dibrom (OP) | 0.44 L | $14.30 | 4 | A or G | 345 |
| | Imidan (OP) | 0.91 kg | $22.20 | 7 | G | 285 |
| | Lorsban/ Nufos/ Pyrinex/ Chlorpyrifos 480 EC (larvae only) (OP) | 0.405 L | $7.34 | 7 | G | 205-418 |
| | Vydate (OP) | 0.93-1.21 L | $16.04-$20.87 | 7 | G | 9-10 |
| | Thionex 50 W (OC) | 0.45-0.61 kg | $11.16-$15.13 | 1 | G | 110 |
| | Thionex EC (OC) | 0.6-0.8 L | $9.75-$13.00 | 2 | G | 110 |
| | Thiodan (OC) | 0.6-0.8 L | $8.94-$11.92 | 1 | G | 107.2 |
| **Potato Flea Beetle** | Genesis (N) | 11.79-17.69 ml per 100 pounds (45.36 kg) of potato seed tubers | $3.05 - $4.58/ 100 pounds of potato seed tubers | NA | Seed Treatment | >4,870 |
| | Admire 240 F (suppression) (N) | Soil Application: 0.344-0.526 L (based on 90 cm row spacing). | $88.98-$136.05 | NA | G | 4143-4870 |
| | Pounce (P) | 0.075-0.10 L | $7.30-$10.00 | 1 | G | 1276 |
| | Decis 5EC (P) | 0.04 -0.06 L | $3.76-$5.64 | 3 | A or G | 395 |
| | Matador (P) | 0.034-0.050 L | $5.07-$7.46 | 7 | A or G | 64-110 |
| | Ripcord (P) | 0.025-0.05 L | $3.09-$6.18 | 7 | A or G | 242-542 |
| | Sevin (C) | 0.50 L | $7.60 | 7 | A or G | 649 |
| | Furadan (C) | 0.222 L | $8.44 | 7 | G | 7.34 |
| | Lannate (C) | 0.2185 kg | $16.99 | 3 | G | 30-34 |
| | Diazinon 50 W (OP) | 0.445 Kg | $11.39 | 14 | G | 1960 |
| | Diazinon 500E (OP) | 0.445 L | $7.52 | 14 | G | 1500 |
| | Diazinon 50 EC (OP) | 0.445 L | $6.85 | 14 | G | NA |
| | Thimet (reduction of Flea beetles) (OP) | 0.14 kg in sandy soils<br>0.215 kg in heavy soils | $0.85-$1.31/ 100m row | 90 | G | 27-31 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| | Monitor (OP) | 0.71-0.91 L | \$20.41-\$26.16 | 14 | A or G | 17 |
| | Dibrom (OP) | 0.44 L | \$14.30 | 4 | A or G | 345 |
| | Imidan (OP) | 0.91 kg | \$22.20 | 7 | G | 285 |
| | Lorsban/ Nufos/ Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.405 L | \$7.34 | 7 | G | 205-418 |
| | Orthene (OP) | 0.30-0.44 kg | \$16.63-\$24.39 | 21 | G | 1030-1447 |
| | Vydate (OP) | 0.93-1.21 L | \$16.04-\$20.87 | 7 | G | 9-10 |
| | Thionex 50W (OC) | 0.45-0.61 kg | \$11.16-\$15.13 | 1 | G | 110 |
| | Thionex EC (OC) | 0.6-0.8 L | \$9.75-\$13.00 | 1 | G | 110 |
| | Thiodan (OC) | 0.6-0.8 L | \$8.94-\$11.92 | 1 | G | 107.2 |
| **Variegated cutworm** | Pounce (P) | 0.075 L | \$7.30 | 1 | G | 1276 |
| | Ripcord (P) | 0.07 L | \$8.65 | 7 | G | 242-542 |
| | Sevin (C) | 0.1-0.125 L/ 300 m of row | \$1.52-\$1.90/ 300 m of row | 7 | A or G | 649 |
| **Stem Borers** | | | | | | |
| **European Corn Borer** | Entrust (S) | 35.4 g / acre | | 7 | G | |
| | Success (S) | 0.059 L | \$27.72 | 7 | G | >5,000 |
| | Sevin (C) | 1.01-2.59 L | \$15.35-\$39.37 | 7 | A or G | 649 |

*Before using any pesticide on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: M=microbials, S=spinosyns, FD=feeding disruptors, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Field Scouting in Rye

### BELOWGROUND FEEDERS AND CUTWORMS

**Cutworms**

***Typical Damage:*** Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.

***When and How to Monitor:*** Look for cutworms, and evidence of cutworm feeding, when monitoring rye in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of the field where cutworm damage is noticeable, check around damaged plants in a 0.25 $m^2$ (50cm x 50cm) areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per $m^2$. Repeat in several locations to get an accurate assessment of what the cutworm levels are.

***Economic Threshold:*** Pale western cutworm - 3-4/$m^2$; Redbacked and army cutworm – 5-6/$m^2$. Well established crops with good moisture conditions can tolerate higher numbers. Sometimes it is most economical to just treat infested patches, and not whole fields.

### SAP FEEDERS

**Aphids**

***Typical Damage:*** Visible wilting of plants, yellow patches in fields, plants are sticky.

***When and How to Monitor:*** Look for aphids when monitor rye in July through early August. While monitoring the field, using a sweep net or tapping plants over a white tray or bucket can alert you to the presence and relative abundance of aphids. If aphid levels appear concerning, a more thorough examination is needed. Count aphids on 20 stems in each of 5 areas. Counts should be at least 50 paces apart, and observations should be made well into the center of the field. Too frequently farmers become alarmed after checking a few plants along the margins, especially near shelterbelts, where populations are high. Record the total number of aphids and calculate the average per plant.

***Economic Threshold:*** 12-15 aphids/stem until about 2 weeks after flowering.

### DEFOLIATOR

**Armyworms**

***Typical Damage:*** Leaves stripped from plants, awns chewed from heads, heads clipped.

***When and How to Monitor:*** Check the soil surface for armyworms, and the plants for feeding, when monitoring rye in mid-June through early-August . At each stop shake plants in 1 yard2 (m2) area and carefully check soil surface for dislodged larvae.

***Economic Threshold:*** 10 larvae/$m^2$. For migrating Armyworms: Treat a couple of swaths ahead of the infestation in the direction of movement to form a barrier strip.

### Rye Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Wireworms** | No insecticides registered for the control of wireworms in rye. | | | | | |
| **Cutworms (Army, black, darksided, pale western, redbacked, white)** | Pounce (P) | 0.075-0.158 L | $7.30-$15.00 | Treat pior to 6 leaf stage | G | 1030 |
| **Sap Feeders** | | | | | | |
| **Aphids** | Malathion 500 (OP) | 0.60-0.80 L | $7.62-$10.16 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.45-1.11 L | $5.56-$13.71 | 7 | A or G | 1375-2800 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Defoliators** | | | | | | |
| **Grasshoppers** | **Spreadable Bran Baits** | | | | | |
| | Eco bran (C) | 0.8-1.6 kg | $3.00-$6.00 | 14 | G | N/A |
| | **Sprays** | | | | | |
| | Sevin XLR Plus (C) | 0.50-1.01 L | $7.60-$15.35 | 14 | A or G | 649 |
| | Malathion 500 (OP) | 0.69 L | $8.64 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.91-1.11 L | $11.24-$13.71 | 7 | A or G | 1375-2800 |
| | Lagon 480E (OP) | 0.22-0.40 L | $6.23-$11.32 | 2 | A or G | 60 |
| **True armyworm** | Sevin XLR Plus (C) | 1.01-2.12 L | $15.35-$32.22 | 14 | A or G | 649 |
| | Malathion 500 (OP) | 0.60-0.80 L | $8.04-$10.72 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.45-1.11 L | $5.56-$13.71 | 7 | A or G | 1375-2800 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: P=pyrethroids, C=carbamates, OP=organophosphates

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

## Safflower Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | $LD_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Defoliators** | | | | | | |
| **Grasshoppers** | Lagon (OP) | 0.22-0.40 L | $6.23-$11.32 | 21 | A or G | 60 |
| | Cygon 480 (OP) | 0.22-0.40 L | $5.91-$10.74 | 21 | A or G | 450 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: OP=organophosphates

[2] $LD_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral $LD_{50}$.

# Field Scouting in Small Grain Cereals (wheat, barley, oats)

## BELOWGROUND FEEDERS AND CUTWORMS

### Cutworms

*Typical Damage:* Notched, wilted, dead, or cut-off plants. Plants missing from rows, bare patches appearing in field.

*When and How to Monitor:* Look for cutworms, and evidence of cutworm feeding, when monitoring in late May to mid-July. Often cutworms will be close to the cut or shriveled plants they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of the field where cutworm damage is noticeable, check around damaged plants in a 0.25 $m^2$ (50cm x 50cm) areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per $m^2$. Repeat in several locations to get an accurate assessment of what the cutworm levels are.

*Economic Threshold:* Pale western cutworm - 3-4/$m^2$; Redbacked and army cutworm – 5-6/$m^2$. Well established fall-seeded crops or spring seeded crops with good moisture conditions can tolerate higher numbers. Sometimes it is most economical to just treat infested patches, and not whole fields.

## SAP FEEDERS

### Aphids

*Typical Damage:* Visible wilting of plants, yellow patches in fields, plants are sticky.

*When and How to Monitor:* Look for aphids when monitoring in July through early August. While monitoring the field, using a sweep net or tapping plants over a white tray or bucket can alert you to the presence and relative abundance of aphids. If aphid levels appear concerning, a more thorough examination is needed. Count aphids on 20 stems in each of 5 areas. Counts should be at least 50 paces apart, and observations should be made well into the center of the field. Too frequently farmers become alarmed after checking a few plants along the margins, especially near shelterbelts, where populations are high. Record the total number of aphids and calculate the average per plant.

*Economic Threshold:* 12-15 aphids/stem prior to the soft dough stage.

### Barley Thrips

*When and How to Monitor:* Sampling should begin when the flag leaf is first visible and continue until the head is completely emerged from the boot. Barley thrips exhibit an edge effect; there are usually more thrips near protected field margins than other areas of the field. Most thrips can be found under the top 2 leaf sheaths. Unroll the leaf sheaths away from the stem to find the thrips.

*Economic Threshold:* Insecticide treatments are only effective when applied before heading is complete. Treat when thrips are equal to or greater than the number calculated by:

Threshold (Thrips/stem) = (Cost of Control ÷ expected $ value per bushel)/0.4

## DEFOLIATORS

### Grasshoppers

*Typical Damage:* Black strips along margins of newly emerging crops, head clipping later in season.

*When and How to Monitor:* Look for grasshoppers when monitoring fields from late-may through to harvest. Check along edges of crop, particularly areas adjacent to hayland, pastures and roadsides. Estimate number of hoppers/yard$^2$ ($m^2$).

*Economic Threshold:* 8-13 grasshoppers/$m^2$. Early in the season, when grasshoppers are small, 18 grasshoppers/$m^2$ and visible crop damage may be a more appropriate threshold.

A rough estimate for an economic threshold for grasshoppers in crops to be used as greenfeed has been suggested at 20 grasshoppers/$m^2$ or higher.

### Armyworms

*Typical Damage:* Leaves stripped from plants, awns chewed from heads, heads clipped.

*When and How to Monitor:* Check the soil surface for armyworms, and the plants for feeding, when monitoring in mid-June through early-August. At each stop shake plants in 1$m^2$ area and carefully check soil surface for dislodged larvae.

*Economic Threshold:* 10 larvae/$m^2$. For migrating Armyworms: Treat a couple of swaths ahead of the infestation in the direction of movement to form a barrier strip.

## SEED FEEDERS ONLY

### Wheat Midge (wheat only)

*When and How to Monitor:* Monitor wheat in July when crop emerges from boot stage until flowering. Check crop canopy at dusk for signs of wheat midge adult activity. At each stop, examine 10 heads. Record the number of midge adults observed on or near heads. Calculate average number of midge per head.

Sticky traps may be used to capture adult midge activity in wheat fields.

*Economic Threshold: For yield only:* 1 adult midge per 4 to 5 heads. At this level of infestation, wheat yields will be reduced by approximately 15% if the midge is not controlled. *To maintain optimum grade:* 1 adult midge per 8 to 10 wheat heads during the susceptible stage.

## Small Grain Cereals (wheat, barley, oats) Insect Management Chart

| Insect | Insecticide (and insecticide group$^1$) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)$^2$ |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Wireworms** | Cruiser 5FS (barley and wheat only) (N) | 33 – 50 mL/ 100 kg seed | | | Seed Treatment | 5,523 |
| | Cruiser 350FS (barley and wheat only) (N) | 57 – 86 mL / 100 kg seed | | | Seed Treatment | |
| **Cutworms (Army, dark sided, pale western, redbacked)** | Decis 5EC (P) | 0.08 L | $7.52 | 31 (oats)<br>40 (barley, wheat) | A or G | 395 |
| | Ricord (barley and wheat only) (P) | 0.07 L | $8.40 | 21 | G | 242-542 |
| | Pounce (P) | 0.075-0.158 | $7.30-$15.00 | Treat prior to 6-leaf stage | G | 1030 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.354-0.486 L | $6.42-$8.81 | 60 | A or G | 205-418 |
| **Sap Feeders** | | | | | | |
| **Aphids** | Malathion 500 (OP) | 0.60-0.8 L | $7.62-$10.16 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.45-1.11 L | $5.56-$13.71 | 7 | A or G | 1375-2800 |
| | Cygon 480 (OP) | 0.17 L | $4.56 | 21 | A or G | 450 |
| **Thrips** | Lannate (C) | 0.1214kg | $9.44 | 20 | A or G | 30-34 |
| | Cygon (OP) | 0.40 L | $10.74 | 21 | A or G | 450 |
| | Lagon (OP) | 0.40 L | $11.32 | 7 | A or G | 60 |
| **Defoliators** | | | | | | |
| **Grasshoppers** | **Spreadable Bran Baits** | | | | | |
| | Eco bran (C) | 0.8-1.6kg | $3.00-$6.00 | 14 (oats, wheat)<br>28 (barley) | G | |
| | **Sprays** | | | | | |
| | Decis Flowable (P) | 0.32-0.048 L | $3.72-$5.58 | 31 (oats)<br>40 (wheat, barley) | A or G | 15000 |
| | Decis 5EC (P) | 0.04-0.06 L (ground)<br>0.06 L (air) | $3.76-$5.64 (ground),<br>$5.64 (air) | 31 (oats)<br>40 (wheat, barley) | A or G | 395 |
| | Ripcord (young grasshoppers only) (wheat and barley only) (P) | 0.02-0.028 L | $2.47-$3.46 | 30 (wheat)<br>60 (barley) | G | 242-542 |
| | Matador (young grasshoppers only) (P) | 0.025 – 0.034 L (Ground)<br>0.034 L (Aerial) | $3.88-$5.07<br>$5.07 | Do not apply within 28 days of harvest or 14 days of livestock foraging | A or G | 64-110 |
| | Sevin XLR Plus (C) | 0.50-1.01 L | $7.60-$15.35 | 14 (wheat, oats)<br>28 (barley) | A or G | 649 |
| | Malathion 500 (OP) | 0.68 L | $8.64 | 7 | A or G | 4302 |

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| | Malathion 500E (young grasshoppers) (OP) | 0.91-1.11 L | \$11.24-\$13.71 | 7 | A or G | 1375-2800 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.235-0.354 L | \$4.26-\$6.42 | 60 | A or G | 205-418 |
| | Lagon (OP) | nymphs-0.22 L<br>adults- 0.34-0.40 L | \$6.23<br>\$9.62-\$11.32 | 2 | A or G | 60 |
| **True Armyworm** | Sevin XLR Plus (C) | 1.01-2.12 L | \$15.35-\$32.22 | 14 (wheat, oats)<br>28 (barley) | A or G | 649 |
| | Lannate (C) | 0.1093-0.2185kg | \$8.50-\$17.00 | 20 | A or G | 30-34 |
| | Malathion 500 (OP) | 0.60-0.80 L | \$7.62-\$10.16 | 7 | A or G | 4302 |
| | Malathion 500E (OP) | 0.45-1.11 L | \$5.56-\$13.71 | 7 | A or G | 1375-2800 |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.354 -0.486 L | \$6.42-\$8.81 | 60 | A or G | 205-418 |
| **Pests of Seed Only** | | | | | | |
| **Wheat Midge (a pest of wheat only)** | Rotate Crops – Continuous wheat cropping encourages higher wheat midge populations. | | | | | |
| | Lorsban/ Nufos/Pyrinex/ Chlorpyrifos 480 EC (OP) | 0.336-0.405 L | \$6.09-\$7.32 | 60 | A or G | 205- 418 |
| | Cygon 480/ Lagon (OP) | 0.40 L | \$10.74-\$11.32 | 21 | A or G | 450 |
| **Stem-Borers** | | | | | | |
| **Hessian Fly** | • Never plant wheat in the same field 2 years in a row in areas where Hessian flies are a problem.<br>• The spring wheat cultivar Superb is partially resistant to the Hessian fly.<br>• Early seeded spring wheat is less susceptible to stem breakage caused by Hessian fly than later seeded wheat.<br>• Winter wheat planted in September will likely be free of Hessian flies. | | | | | |
| **Wheat stem sawfly** | Solid-stem wheat varieties (such as the hard red spring wheat varieties AC Lillian, AC Abbey, and AC Eatonia) can reduce damage by wheat stem sawfly larvae compared to susceptible varieties, however the level of control can vary depending on environmental conditions. | | | | | |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: N= neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Scouting for insects in Soybeans

### Soybean Aphid

Note – Although soybean aphids have been found in Manitoba since 2001, populations have never been found in economic numbers. Looking for soybean aphids while monitoring soybean fields is advised however. Note that very high numbers of soybean aphid are required to cause economic damage to soybeans.

***Typical Damage:*** Soybean aphids suck sap from soybean plants. Infested leaves may wilt or curl when infestations are large. Other symptoms may include plant stunting, reduced pod and seed count, and yellowing of leaves.

***Economic Threshold:*** When there are on average more than 250 aphids per plant, and the plants are in the R1 (beginning bloom) to R4 (full pod) growth stages, treatment would be economical.

### Soybean Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Wireworms** | Cruiser 350FS (N) | 143 mL/ 100 kg seed | | | Seed Treatment | |
| **Seedcorn Maggot** | Cruiser 350FS (N) | 86-143 mL/ 100 kg seed | | | Seed Treatment | |
| | Agrox CD, Agrox B-2 (OP) | See "Disease Control – Seed Treatments" section of this guide. | | | | N/A |
| | Diazinon 50W (OP) | 20 g/300 mL water/4L seed | | | Seed Treatment | 1960 |
| **Cutworms** | Matador (P) | 0.034 L | $5.07 | 21 | G | 64-110 |
| **Sap Feeders** | | | | | | |
| **Soybean Aphid** | Matador (P) | 0.034 L | $5.07 | 21 | G | 64-110 |
| | Lagon (OP) | 0.28-0.40 L | $7.92-$11.32 | 30 | A or G | 60 |
| **Leafhoppers** | Lagon (OP) | 0.28-0.40 L | $7.92-$11.32 | 30 | A or G | 60 |
| **Lygus bugs** | Matador (P) | 0.034 L | $5.07 | 21 | G | 64-110 |
| | Lagon (OP) | 0.28-0.40 L | $7.92-$11.32 | 30 | A or G | 60 |
| **Spider mites** | Cygon 480 (OP) | 0.40 L | $10.74 | 30 | A or G | 450 |
| | Lagon (OP) | 0.40 L | $11.32 | 7 | A or G | 60 |
| **Defoliators** | | | | | | |
| **Grasshoppers** | Matador (P) | 0.034 L | $5.07 | 21 | G | 64-110 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: N= neonicotinoids, P=pyrethroids, OP=organophosphates

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Stored Grain Insect Control –

See Insect Control in Stored Grain at the end of the Insect Control section of this guide.

## Summerfallow –

See grasshopper management on Pastures, etc.

## Scouting for insects in Sunflower

### BELOWGROUND FEEDERS AND CUTWORMS

**Cutworm**

***Typical Damage:*** Notched, wilted, dead, and cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.

***When and How to Monitor:*** Look for cutworms, and evidence of cutworm feeding, when monitoring sunflowers in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of a field where cutworm damage is noticeable, check around damaged plants in a 0.25 $m^2$ (50cm x 50cm) areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per $m^2$. Repeat in several locations to get an accurate assessment of what the cutworm levels are.

***Economic Threshold:*** When cutworm densities exceed 10/ $m^2$. Sometimes it is most economical to just treat infested patches, and not whole fields.

### DEFOLIATOR

**Sunflower Beetle**

***Typical Damage:*** Adults: Leaves of seedling plants chewed or completely destroyed late May through June, shot-holes or large areas of leaves chewed July through August. Larvae: Leaves of plants chewed or completely destroyed.

***When and How to Monitor:*** Adults: Look for when monitoring sunflower seedlings in May through June. Examine 10 plants at random at each stop. Larvae: Look for when monitoring sunflowers in July through mid-August. Examine 10 plants at random at each sampling site. Peel back leaves around growing tip and record total number of larvae found. Calculate average number per plant.

***Economic Threshold:*** Adults: 1-2/seedling; Larvae: 10 to 15/plant or 25-30% defoliation.

## Insects affecting the seeds

### PESTS OF SEED ONLY

**Red Sunflower Seed Weevil**

***Typical Damage:*** Seeds partly or completely destroyed, exit hole in hull. Shriveled kernels, kernels completely destroyed.

***When and How to Monitor:*** Monitor fields when ray petal being to form and continue every 2 to 3 days until pollination is complete. When scouting, use the X pattern and begin counts at least 70 to 100 feet into the field to avoid margin effects. Examine 5 plants at each site for a total of 25 plants. For checking individual sunflower heads, brush the face of the head vigorously to bring the weevils to the surface, or use a commercial preparation of mosquito repellent containing diethyl toluamide (DEET) to spray the heads. This will cause the weevils to move out of hiding spots. Record total number of weevils and calculate average per head.

***Economic Threshold:***

Confection Sunflowers: 1-2 weevils/plant. Control is based on a need to keep seed damage below 3 or 4% because of industry standards.

Oilseed sunflowers: 12-14 weevils/head.

The ideal plant stage to treat is when most plants in the field are at 40% pollen shed (R5.4).

**Banded Sunflower Moth**

***When and How to Monitor:*** Look for banded sunflower moth adults when monitoring fields in the late bud (R-4) to early bloom (R5.1) plant growth stage. Count moths on 20 plants from 5 different sites for a total of 100 plants. Sampling in early evening or early morning when the moths are most active gives the most accurate counts.

A sampling strategy based on scouting for adult moths during daylight hours has also been developed.

***Economic Threshold:*** 1 moth per 2 plants when monitoring in the early evening or early morning.

If monitoring for adult moths during daylight hours, tables for determining economic thresholds can be found at: http://www.ext.nodak.edu/extpubs/plantsci/pests/e823w.htm If treatment is warranted, it should be applied at the R5.1 sunflower plant growth stage.

## Sunflowers Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Belowground Feeders and Cutworms** | | | | | | |
| **Wireworms** | Wireworms may sometimes damage sunflowers. Seeding sunflowers when the soil temperature is at least 8 to 10°C at 1 to 1.5 inches depth may minimize damage by wireworms. | | | | | |
| **Cutworms** | Pounce (P) | 0.075-0.158 L | $7.30-$15.00 | Treat prior to 6-leaf stage | G | 1030 |
| | Lorsban/Pyrinex/Nufos/Chlorpyrifos 480 EC (OP) | 0.486 L | $8.81 | 42 | G | 205-418 |
| **Defoliators** | | | | | | |
| **Grasshoppers** | No insecticides registered for control of grasshoppers in sunflowers. | | | | | |
| **Sunflower Beetle** | Decis 5EC (P) | 0.04 L | $3.76 | 70 | A or G | 395 |
| | Matador (P) | 0.017 – 0.025 L (Ground)<br>0.034 L (Aerial) | $2.53-$3.88<br>$5.07 | 7 | A or G | 64-110 |
| | Ripcord (P) | 0.028 L | $3.46 | 70 | A or G | 242-542 |
| | Furadan (C) | 0.11 L | $4.18 | 60 | G | 7.34 |
| | Thionex EC (OC) | 0.6 L | $9.75 | 60 | G | 110 |
| | Thiodan (OC) | 0.6 L | $8.94 | 60 | G | 107.2 |
| **Pests of Seed Only** | | | | | | |
| **Sunflower Seed Weevil** | Early planting helps to reduce seed damage by sunflower seed weevils | | | | | |
| | Ripcord (P) | 0.028 L | $3.46 | 70 | A or G | 242-542 |
| | Lorsban/Nufos (OP) | 0.486 L | $8.81 | 42 | A or G | 272/205 |
| **Banded sunflower moth** | Late planting may provide some control | | | | | |
| **Sunflower Moth** | Dipel (young larvae) (M) | 0.1275-0.2529 kg | $11.22-$22.26 | N/A | A or G | > 4,000 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: M=microbial, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Field Scouting in Sweet Clover

### DEFOLIATOR

**Sweetclover Weevil**

***Typical Damage:*** Adults chew crescent-shaped and jagged notches in leaves and can completely defoliate plants.

***When and How to Monitor:*** Inspect clover seedlings for weevil damage in spring as the seedlings emerge. In mid-summer and throughout August, inspect first-year clover stands for damage along crop margins. Invading weevils move into these stands only as far as necessary to satisfy their food requirements, so an insecticide application to affected field margins is usually all that is required. Visually estimating the number of weevils per plant must be done carefully because weevils fall from plants easily and are difficult to see on the ground.

***Economic Threshold:*** 1st year stands: 1 weevil adult/3 seedlings (1/5 seedlings under dry conditions). 2nd year stands: 9-12 weevil adults/plant.

## Sweet Clover Insect Management Chart

| Insect | Insecticide (and insecticide group[1]) | Rate/Acre | Cost/Acre | Preharvest interval (days) | Application (A=aerial; G=ground) | LD$_{50}$ (Mammalian Toxicity)[2] |
|---|---|---|---|---|---|---|
| **Defoliators** | | | | | | |
| **Grasshoppers** | **Spreadable Bran Baits** | | | | | |
| | Eco bran (C) | 0.8-1.6kg | \$3.00-\$6.00 | 2 | G | N/A |
| | **Sprays** | | | | | |
| | Sevin XLR Plus (C) | 0.50-1.01 L | \$7.60-\$15.35 | 2 | A or G | 649 |
| | Malathion 500E (OP) | 0.91-1.11 L | \$11.24-\$13.71 | 7 | A or G | 1375-2800 |
| **Sweetclover Weevil** | Locate new seedlings as far as possible from 2nd-year clover. Cultivating second-year stands of sweet clover silage and hay as soon as possible after the crop is taken kills the new- generation weevil larvae in the soil. | | | | | |
| | Malathion 500 (OP)<br>Malathion 500E (OP) | 0.56-1.01 L<br>0.61-1.01 L | \$7.11-\$12.83<br>\$7.53-\$12.47 | 7-Cattle may be returned immediately after spraying. | A or G | 1375-2800 |
| | Cygon/Lagon (OP) | 0.34-0.44 L | \$9.62-\$13.42 | 28 | A or G | 450/60 |
| **Blister Beetle** | Sevin XLR Plus (C) | 1.01-1.6 L | \$15.35-\$24.32 | 2 | A or G | 649 |
| **Beet Webworm** | Sevin XLR Plus (C) | 1.01-2.12 L | \$15.35-\$32.22 | 2 | A or G | 649 |
| **Sap Feeders** | | | | | | |
| **Lygus Bugs** | Dibrom (OP) | 0.44-0.88 L | \$14.30-\$28.59 | 4 | A or G | 345 |
| **Leafhoppers** | Sevin XLR Plus (C) | 1.01-1.6 L | \$15.35-\$24.32 | 2 | A or G | 649 |
| | Malathion 500E (OP) | 0.91-1.11 L | \$11.24-\$13.71 | 7 | A or G | 1375-2800 |
| | Dibrom (OP) | 0.44-0.88 L | \$14.30-\$28.59 | 4 | A or G | 345 |
| **Aphids** | Dibrom (OP) | 0.44-0.88 L | \$14.30-\$28.59 | 4 | A or G | 345 |

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

[1] Insecticide Group: C=carbamates, OP=organophosphates

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

## Timothy –

See forage grasses

## Wheat –

See small grain cereals

## Insecticide Poisoning in Humans

Organophosphate (OP) and carbamate insecticides (identified on the Insecticide Groups chart page 318) can pose a more serious risk to unprotected persons. Poisonings can occur while mixing, loading and/or during the application of these products without the appropriate protective equipment or measures. These pesticides are readily absorbed through the skin or the lungs, and can act as nervous system toxins. Overexposure can produce symptoms such as headache, nausea, pupil dilation and excessive sweating and salivation. Higher doses may cause breathing difficulties, muscle twitching, weakness and spasms. Very high doses have caused respiratory failure and death.

Both OP and carbamate pesticides inhibit an enzyme called cholinesterase. Measurements of cholinesterase in the blood before and during the application season can indicate harmful exposures to OPs and carbamates. **Persons who intend to mix, load and/or apply these types of pesticides repeatedly during a season, need a baseline and repeat measurements. Consult your doctor before the spraying season to arrange for these measurements.** For more information, see ***Monitoring Exposure to Organophosphorous and/or Carbamate Insecticides,*** a joint publication of Saskatchewan Labour and Saskatchewan Health. This publication can be viewed on the SK Labour web site: www.labour.gov.sk.ca.

## Degree of Risk and Hazard Rating:

(see page 10 for full description)

Danger poison: $LD_{50}$ is less than 500 mg/kg and indicates high toxicity.

Warning poison: $LD_{50}$ is between 500-1,000 mg/kg and indicates moderate toxicity.

Caution poison: $LD_{50}$ is between 1,000-2,500 mg/kg and indicates low toxicity.

($LD_{50}$ values are used to rate the toxicity of pesticides. They refer to the dose of pesticide (in mg per kg) that is lethal to 50 percent of a test animal population).

## Resistance of Insects to Insecticides

Repeated use of the same insecticide, or insecticides with the same mode of action, against a particular insect in a given area may result in the effectiveness of the insecticide being reduced.

To delay or prevent resistance of insects to insecticides:

1. Integrate different control methods (cultural, biological, chemical) into insect control programs whenever possible.
2. Use insecticides only when the economic threshold for a pest has been surpassed and natural controls fail to limit economic damage, and
3. Rotate between insecticides with different modes of action, particularly if several applications are made in a season.
4. Keep accurate records of insecticides used for each of your fields.

Insecticides can be classified according to their similarity in chemical structure (chemical group in the table below), and by mode of action (the process by which the insecticide kills the insect). The "Group" column in the table below separates insecticides based on their mode of action. By selecting products with different modes of action for an insecticide rotation program, insecticide resistance can be prevented.

## Insecticide Groups Based on Modes of Action

| GROUP | CHEMICAL GROUP | TRADE NAME | ACTIVE INGREDIENT | MODE OF ENTRY |
|---|---|---|---|---|
| 1A | Carbamates | Sevin, Eco Bran | carbaryl | contact/ ingestion (Sevin)<br>ingestion (Eco Bran) |
| | | Lannate | methomyl | contact/ ingestion |
| | | Furadan | carbofuran | contact/ ingestion |
| 1B | Organophosphates | Malathion | malathion | contact |
| | | Diazinon | diazinon | contact/ ingestion |
| | | Orthene | acephate | contact/ ingestion |
| | | Dibrom | naled | contact/ ingestion |
| | | Imidan | phosmet | |
| | | Lorsban, Pyrinex, Nufos, Chlorpyrifos | chlorpyrifos | contact/ ingestion/ inhalation |
| | | Cygon, Lagon | dimethoate | contact/ ingestion |
| | | Thimet | phorate | ingestion |
| | | Monitor | methamidophos | contact/ ingestion |
| | | Vydate | oxamyl | contact/ ingestion |
| 2A | Organochlorines | Thiodan, Thionex | endosulfan | contact/ ingestion |
| 3 | Pyrethroids | Decis | deltamethrin | contact/ ingestion |
| | | Ripcord | cypermethrin | contact/ ingestion |
| | | Matador | cyhalothrin-lambda | contact/ ingestion |
| | | Pounce | permethrin | contact/ ingestion |
| | | Tempo | cyfluthrin | |
| 4 | Neonicotinoids | Helix, Cruiser | thiamethoxam | ingestion |
| | | Admire, Gaucho, Genesis | imidacloprid | contact/ ingestion (Admire)<br>ingestion (Gaucho, Genesis) |
| | | Assail | acetamiprid | contact/ ingestion |
| | | Prosper, Poncho | clothianidin | ingestion |
| 5 | Spinosyns | Success, Entrust | spinosad | |
| 8B | Fumigant | Phostoxin | aluminum phosphide | |
| 9B | Feeding Disruptors | Fulfill | pymetrozine | ingestion mainly, some contact activity |
| 11 | Microbials | Dipel | *Bacillus thuringiensis var. Kurstaki* | ingestion |
| | | Novodor | *Bacillus thuringiensis var. Tenebrionis* | ingestion |

A more detailed table showing insecticides organized by mode (site) of action, and specific information on the mode (site) of action for the different groups can be found in Appendix III of PMRA Regulatory Directive DIR99-06 found at: http://www.hc-sc.gc.ca/pmra-arla/english/pdf/dir/dir9906-e.pdf

# Insecticide Directory

**For rates, costs, and preharvest intervals for insecticides, see the insect management charts on pp. 299-332.**

## Admire

### Company:

Bayer CropScience PCP# 24094

### Formulation:

240 g/L imidacloprid formulated as a flowable

### Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potato | Colorado potato beetle, aphids, leafhoppers, potato flea beetles (suppression only) |

### Application:

Do not apply by air.

**Soil application:** For best results, direct spray on the seed pieces or seed potatoes in the furrow. The higher rate is recommended when extended length of control is needed. Do not follow a soil application with a foliar application.

**Foliar application:** A maximum of two foliar applications of Admire may be made per season.

### How it Works:

Admire is a systemic, chloronicotinyl insecticide.

### Restrictions:

Do not apply within 15m of well-heads or aquatic systems, including marshes, ponds, ditches, streams, lakes, etc. Do not apply through any type of irrigation system.

### Precautions:

Do not re-enter treated areas for 24 hours after foliar application of Admire. Admire is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Highly toxic to aquatic invertebrates and birds.

### Hazard Rating:

▽ Caution Poison

# Assail

## Company:

E.I. duPont Canada Inc. PCP# 27128

## Formulation:

Acetamiprid formulated as a wettable powder - 70% by weight

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potato | Colorado potato beetle, aphids |

## Application:

For ground application only. DO NOT APPLY BY AIR.

Apply with a minimum finished spray volume of 80 litres per acre. For best results uniform spray coverage of the host plants is important.

Begin application when insect levels reach economic thresholds. Use higher rates for heavy infestations, dense foliage or for adult stages of the Colorado potato beetle. Residual control will depend on environmental factors, plant growth, application rate and level of insect infestation.

## How it Works:

Assail is a chloronicotinyl insecticide that works by contact or ingestion. It has an anti-feedant effect that can prevent pest damage to host plants prior to the death of the insect. This product rapidly degrades in the soil with no carryover effects.

## Restrictions:

Do not make more than 2 applications per year per crop.

Do not apply more than once every 7 days.

Do not exceed a total of 48 g active ingredient (68.8 g product) per acre per season.

Do not apply less than 7 days prior to harvest (pre-harvest interval).

## Precautions:

Do not re-enter treated areas for a period of 12 hours after application.

An untreated buffer zone between the last spray swath and the edge of aquatic systems (such as rivers, streams, lakes, and other water bodies) must be established. For ground boom sprayers - 20 metres. Do not apply Assail directly to water or to areas where surface water is present.

Do not apply when honey bees are present in the area to be treated as acetamiprid is toxic to honey bees if exposed to direct treatment.

If this product is to be applied to a product destined for export to the United States, information on acceptable residue levels are available at www.cropro.org/.

Storage: Do not store in or around the home. Store unused product in a cool, ventilated, dry, locked area. Do not allow prolonged storage in areas where temperatures frequently exceed 46 degrees C.

## Hazard Rating:

◈ Warning Poison

# Cygon/Lagon

## Company:

IPCO (Cygon 4E - PCP# 09807)
Cheminova (Cygon 480-Ag - PCP# 25651)
United Agri Products (Lagon 480E - PCP# 9382)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

## Formulations:

Cygon/Lagon-480 g/L dimethoate formulated as an emulsifiable concentrate. Container size-10 L.

## Insects Controlled and Registered Crops:

| CROP | Cygon 480-Ag INSECT | Lagon 480E INSECT | Cygon 4E INSECT |
|---|---|---|---|
| peas | | aphids | |
| potatoes | aphids, leafhoppers | aphids, leafhoppers, Lygus bugs | aphids (ground application only), leafhoppers |
| alfalfa (*seed production only) | aphids, leafhoppers, Lygus bugs, plant bugs*, alfalfa blotch leaf miner, grasshoppers, reduction of alfalfa weevil larvae | aphids, leafhoppers, alfalfa blotch leafminers, grasshoppers, reduction of alfalfa weevil larvae, Lygus bugs*, plant bugs* | aphids, grasshoppers, leafhoppers, Lygus bugs, plant bugs, reduction of alfalfa weevil larvae, sweet clover weevil |
| canaryseed | aphids | aphids | |
| canola / rapeseed | aphids, leafhoppers, grasshoppers, | aphids, leafhoppers, grasshoppers, | |
| forage crops | Lygus bugs, plant bugs, grasshoppers | grasshoppers, aphids (suppression only of Russian wheat aphid) | aphids, grasshoppers, leafhoppers, Lygus bugs, plant bugs, reduction of alfalfa weevil larvae, sweet clover weevil |
| sweet clover, red clover, alsike clover | sweet clover weevil | sweet clover weevil | |
| pastures, wastelands | grasshoppers | grasshoppers | grasshoppers |
| wheat | wheat midge, thrips, aphids (suppression only of Russian wheat aphid) | thrips, grasshoppers, Russian wheat aphid | |
| barley, oats | thrips, aphids (suppression only of Russian wheat aphid) | thrips, grasshoppers, | |
| flax | aphids | aphids | |
| soybeans | aphids, leafhoppers, Lygus bugs, mites | aphids, leafhoppers, Lygus bugs, spider mites | |

## Application:

May be applied by air or ground equipment (unless otherwise specified above). Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for adult insects, heavy infestations or dense canopy.

## How it Works:

Broad spectrum, systemic (within the plant) and contact, organophosphate insecticide and acaricide.

## Restrictions:

**Grazing:** Remove cattle prior to spraying. Read label carefully to determine livestock reentry period.

**Storage:** Store at temperatures between 4°C and 30°C and in areas away from feed and food.

**Others:** Do not treat when bees are foraging. Do not apply to alfalfa in bloom. Read label carefully to determine maximum number of applications per season. Wait at least 10 days before placing leafcutter bees in treated fields.

## Precautions:

Dimethoate is of high acute mammalian toxicity and is highly toxic to birds, bees and other animals. Wear a respirator, goggles, rubber gloves, rubber boots and coveralls when handling concentrate. Avoid contact with skin and eyes. Do not inhale spray mist.

## Hazard Rating:

◈ Warning Poison-Lagon, Cygon 480 AG

⊛ Danger Poison-Cygon 4E

# Decis

## Company:

Bayer CropScience
(Decis 5EC - PCP# 17734; Decis Flowable - PCP# 20078)

## Formulations:

50 g/L deltamethrin formulated as an emulsifiable concentrate and as a flowable.

Container sizes: Decis 5EC-2.5 L and 2 L jugs; Decis Flowable - 3 L jugs.

## Insects Controlled and Registered Crops:

**DECIS 5EC**

| CROPS | INSECT |
|---|---|
| Alfalfa (seed crops only) | Lygus bug, alfalfa weevil |
| Field corn | European corn borer |
| Potatoes | Colorado potato beetle, potato flea beetle, Lygus bugs, leafhopper |
| Canola (rapeseed), mustard | Flea beetles, clover cutworm, bertha armyworm, diamondback moth, beet webworm, cabbage seedpod weevil, Lygus bugs, grasshoppers (canola only) |
| Sunflowers | Sunflower beetle |
| Wheat, barley, oats, lentils | Cutworms, grasshoppers |
| Rangeland, pastures, roadside, fence row | Grasshoppers |
| Flax | Cutworms, beet webworm, grasshoppers |

## Application:

Decis may be applied by air or ground equipment to all crops with the exception of alfalfa and corn, which require ground application only. Apply when insects exceed economic threshold numbers with sufficient water for good coverage. Use higher rates for severe infestations, on dense foliage or when a number of insect growth stages are present.

Alfalfa (seed production) - Use higher rates if alfalfa weevil present

## Tank Mixes:

May be tank mixed with the following herbicides:

Pardner, Buctril M
Banvel, MCPA
2,4 -D,
Puma$^{120}$ Super

## How it Works:

Decis is a non-systemic, synthetic pyrethroid which works by contact and ingestion.

## Effects of Weather:

Do not spray under a strong temperature inversion, or when temperature exceeds 25°C. Do not apply within 1 hour of rain.

## Restrictions:

**Grazing:** Do not feed treated alfalfa to beef cattle within 90 days of harvest. Do not allow beef cattle to graze treated cereals, flax, lentils, pasture or rangeland within 1 day of application. Dairy cattle must not be fed or grazed on Decis treated crops.

**Storage:** Do not store below freezing. Do not store near feed, food, seeds or fertilizer. Keep away from heat, sparks and open flames. If stored for 1 year or longer, shake well before using.

**Others:** Observe a 16 yard (15 m) buffer zone from environmentally sensitive areas (for example, wetlands, sloughs, rivers, houses, farm buildings) when applying by ground equipment and a 110 yard (100m) buffer zone when applied by air. The number of aerial applications permitted varies with crop. Consult container label. In soils with high organic content (muck soils), Decis 5 EC should be applied only once per season, prior to August 1, and at rates of no more than 80 mL/acre.

**Decis Flowable**

| CROPS | INSECT |
|---|---|
| Canola (rapeseed), mustard | Flea beetle |
| Wheat, barley, oats, lentils, flax | Grasshoppers |
| Rangeland, pastures, roadside | Grasshoppers |

## Precautions:

Decis is of high mammalian toxicity and is a severe eye and skin irritant. Avoid contacting or breathing spray mist. Very toxic to aquatic organisms and fish. Toxic to bees. Avoid spraying when bees are foraging. Wear protective clothing, including goggles and respirator, when handling or spraying. Do not contaminate or store near feed or foodstuffs. Wash thoroughly after using Decis.

## Hazard Rating:

☠ Danger Poison

# Diazinon

## Company:

United Agri Products (Diazinon 500E - PCP# 11889; Diazinon 50W - PCP# 19576)

IPCO (Diazinon 50 EC PCP# 27538)

## Formulations:

Diazinon 500E – 50% diazinon formulated as a liquid. Container size: 4 L, 10L

Diazinon 50 EC – 50% diazinon formulated as an emulsifiable concentrate. Container size: 10 L

Diazinon 50W – 50% diazinon formulated as a wettable powder. Container size: 2 kg

Different trade names refer to different companies. Note that products may have different label registrations and recommendations. Check the label for more information.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potatoes | Aphids, flea beetles, Colorado potato beetles, leafhoppers |
| Corn, peas, beans | Seedcorn maggot |
| Beans (field) | Aphids |
| Rangeland, pasture, ditch banks, roadsides, fence rows, wasteland. | Grasshoppers |

## Application:

Apply Diazinon 50W by ground only.

## How it Works:

Diazinon is an organophosphate insecticide with systemic and contact activity.

## Effects of Weather:

Diazinon 50 EC/500E and 50W work most effectively if the temperature is 20°C or more or when temperatures will reach or exceed this minimum.

## Restrictions:

**Beneficial insects:** Avoid spraying open flowers. Highly toxic to bees exposed to direct treatment or to residues on crops.

**Environment:** Do not contaminate any body of water, waterway or water source. Toxic to birds, fish, and wildlife, including waterfowl.

## Precautions:

May be fatal if swallowed. Avoid contact with skin and inhalation of spray mist. Wear an approved respirator. Wash thoroughly after handling and before eating, drinking and smoking.

## Hazard Rating:

☠ Danger Poison

# Dibrom

## Company:

United Agri Products PCP# 7442

## Formulations:

864 g/L naled formulated as an emulsifiable concentrate.

Container size – 4 x 3.78 L jugs per case and 2 x 9.46 L jugs per case

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Alfalfa, Clover, Vetch | Aphids, loopers, leafhoppers, Lygus bugs |
| Potatoes | Flea beetles, Colorado potato beetles, leafhoppers |
| Rangeland, field areas and pastures. | Grasshoppers |

## Application:

Apply Dibrom by ground or air. Use designated amounts in full volumes of water. For ground application use 100 – 300 L of water per hectare. For aerial use 11-22 L of water per hectare unless otherwise stated.

## How it Works:

Dibrom is an organophosphate insecticide. It acts as a contact and stomach poison.

## Effects of Weather:

Do not apply Dibrom when air temperature is greater than 32°C.

## Restrictions:

Environment: Do not contaminate any body of water, waterway or water source. Dibrom is highly to moderately toxic to birds, aquatic animals and other wildlife.

## Precautions:

Concentrate may cause skin damage. Do not get on skin, eyes or clothing. Use waterproof gloves and face shield or goggles when handling concentrate. Harmful if swallowed. Avoid breathing spray mist.

Avoid contamination of feed, foodstuffs and drinking water.

Highly toxic to bees, avoid application during periods of bee activity.

## Hazard Rating:

☠ Danger Poison

# Dipel 2X DF

## Company:

Valent BioSciences PCP# 26508

## Formulation:

32 BIU/kg of *Bacillus thuringiensis subsp. Kurstaki* formulated as a dry flowable

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Sunflower | Sunflower moth |
| Timothy | Essex (European) skipper |
| Corn | European corn borer larvae |

## Application:

Treat when larvae are young (early instars) before the crop is damaged. A spreader sticker such as Triton B1956 should be used to give thorough foliage coverage.

## How it Works:

A biological stomach insecticide resulting in the larvae ceasing to eat in a few hours, with death usually occurring within 1-3 days.

## Restrictions:

**Storage:** Store at temperatures between 0° and 25°C (cooler temperatures preferable).

**Others:** Do not allow dilute spray to stand in tank for more than 12 hours. Use product within 24 months of date of manufacture if stored at cool temperatures. Final spray solution for Bt should have a pH of 5-7.

## Precautions:

Harmful if swallowed, inhaled, or absorbed through the skin. Avoid breathing dust or spray mist. Avoid contact with skin, eyes, or clothing. In case of contact with eyes or skin, immediately flush eyes or skin with plenty of water.

## Hazard Rating:

Caution Poison

# Eco Bran

## Company:

Peacock Industries PCP# 25815

## Formulation:

Wheat bran infused with carbaryl insecticide

Container size – 20 kg bag; 1kg bottle

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Alfalfa, beans, clover, corn, oats, rye, wheat, barley, canola, pastures, rangelands, forage grasses, field borders, headlands, rights-of-way, roadsides, wastelands | Grasshoppers |

## Preharvest Intervals and Livestock Re-entry Periods:

| Crop | Preharvest Interval/ Livestock re-entry period |
|---|---|
| Corn | 1 |
| Alfalfa, clover | 2 |
| Beans | 5 |
| Oats, rye, wheat | 14 |
| Barley | 28 |
| Canola | Treat only seedlings |
| Field borders, headlands, rights-of-way, roadsides, wastelands | 0 |
| Entry of beef cattle or other livestock to pastures, rangelands or forage grasses | 1 |
| Entry of dairy cattle to pastures or rangelands, harvest of forage crops | 2 |

## Application:

For ground application only. Do not apply by air.

Broadcast application may be made with spreaders, hand applicators, or by hand. Use gloves and wash thoroughly following application. More information on application and applicators can be found at: http://www.grasshoppercontrol.com

## Restrictions:

Do not apply within 50m of sloughs, ponds, streams, dugouts or open water. Apply when winds are between 3-8 kph and do not favour drift.

Presence of product on flowering crops such as alfalfa and clover will not harm foraging honey or leafcutter bees.

May be used in pastures while beef cattle are grazing.

## Precautions:

Harmful if inhaled or swallowed. Avoid breathing dust or vapour from bait. Use only in well-ventilated areas. May cause eye irritation. Avoid contact with eyes and skin. Wash thoroughly after handling and before eating or smoking. Avoid contamination of feed and foodstuffs. Keep away from heat, sparks and open flame.

# Entrust 80 W

## Company:

Dow AgroSciences PCP# 27825

## Formulation:

80 % spinosad

Container size – 4 x 113.4 g packets

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potatoes | Colorado potato beetle larvae and European corn borer larvae |

## Application:

Apply Entrust 80 W Naturalyte Insect Control Product as a foliar spray by ground only. Apply when scouting indicates the target pest species have reached economic threshold levels. For Colorado potato beetle larvae, target eggs at hatch or small larvae. For control of European corn borer, time the application to coincide with peak egg hatch. Use higher application rate for higher pest pressure or when extended egg hatch is anticipated. If pest populations persist, a repeat application 7 to 10 days after the initial application may be necessary.

## How it works:

Entrust 80 W is in the spinosine class of insecticides. It is a contact and stomach insecticide. It is derived from the fermentation of Saccharpolyspora spinosa.

## Effects of weather:

This product has the potential for run-off. Do not spray immediately after a rainfall or if rain is forecast within 48 hours after application.

## Restrictions:

**Storage:** Avoid freezing. Do not store or ship with food, feeds, drugs or clothing.

**Others:** Do not make more than 2 applications per season (maximum of 150 g /ha)

## Precautions:

Entrust 80 W is highly toxic to honey bees exposed to direct spray. Avoid spraying on crops in bloom or other vegetation when bees are actively foraging. This product is toxic to other beneficial parasites and predators. Do not contaminate aquatic habitats such as ponds, lakes, rivers, streams and wetlands during application or when rinsing equipment and containers. A buffer zone of 2 metres (early season) or 1 metre (late season) is required between downwind edge of spray boom and sensitive aquatic habitats. Avoid contact with eyes, skin, and clothing. Do not enter or allow worker entry into treated areas for a period of 12 hours after application.

## Hazard Rating:

☠ Caution Poison

# Fulfill 50WG

## Company:

Syngenta Crop Protection Canada, Inc. PCP # 27274

## Formulation:

50% pymetrozine formulated as a wettable granule

## Insects Controlled and Registered Crop:

| CROP | INSECT |
|---|---|
| Potatoes | Aphids including: Green peach, Potato, Foxglove, Buckthorn |

## Application:

Apply by ground only. Apply Fulfill 50WG to plant foliage. Thorough spray coverage is essential for best performance. Apply Fulfill 50 WG with sufficient water (minimum of 100 L/ha) to ensure good coverage of all plant surfaces. Higher water volumes will generally result in better coverage, especially under adverse conditions (hot, dry), where a dense plant canopy exists and/or aphid infestations are high. One additional application may be needed to control persistent aphid populations. Allow a minimum of 7 days between applications.

The use of a non-ionic adjuvant is recommended to improve the performance of Fulfill 50WG insecticide under drought stress conditions.

## How it Works:

Fulfill 50WG is a systemic insecticide and works primarily by ingestion and but has some contact activity. Affected aphids stop feeding shortly after exposure, but may remain on the plant foliage until they die, which is usually within 2-4 days. Fulfill 50WG Insecticide has residual activity in the plant and will control aphids that move onto the plant after spraying.

Fulfill 50WG has shown no phytotoxicity on the varieties of potato tested when applied at the label rates.

## Effects of Weather:

Fulfill 50WG Insecticide exhibits movement through the leaf surface into plant tissue and is rainfast as soon as the spray solution has dried.

## Restrictions:

**Storage:** Store in a cool, dry, place away from food, drinks, and animal feeding stuffs. Keep in the original container tightly closed.

**Others:** Do not apply by air. Do not exceed 2 applications (386 g product/ha) per crop per season. Do not apply directly to aquatic systems, permanent water bodies or areas where surface water is present. Do not contaminate water when cleaning equipment or disposing of equipment wash water.

Do not apply Fulfill 50WG insecticide through chemigation.

Do not use in nurseries or in plant propagation houses, or on any plants grown for use as transplants. A re-cropping restriction of 30 days is required for all crops.

## Precautions:

May cause skin ,sensitization reactions. Applicators and other handlers must wear personal protective equipment including, long-sleeved shirt, long pants, waterproof gloves and shoes plus socks. Do not enter or allow entry into treated areas for 12 hours. Do not use, pour, spill, or store near heat or open flame.

## Hazard Rating:

☠ Caution Poison

# Furadan

## Company:

Bayer CropScience PCP# 10828

## Formulations:

480 g/L carbofuran formulated as a flowable.

Container sizes: Furadan 480F-4 L jug

## How it Works:

Furadan is a broad spectrum, carbamate insecticide, acaricide and nematicide.

## Effects of Weather:

Avoid spraying when winds are more than 15 km/hr or less than 5 km/hr. When conditions are hot and dry, set up equipment to produce larger droplets to reduce evaporation effects.

## Tank Mixes:

Furadan 480F is compatible with fungicides commonly used on the same crops. Do not mix with Bordeaux and hydrated lime.

## Restrictions:

**Storage:** Do not store below 2°C. Store separately from food and feed.

**Aerial restrictions:** Do not apply by air on potatoes or sunflowers. Do not spray fields of corn smaller than 12.5 acres (5 ha) by air.

Do not apply Furadan to areas where bees are actively foraging or near apiaries. Do not spray sunflowers after plants are more than 24 inches (60 cm) in height or after heads have started to form. The use of Furadan 480F may be hazardous to burrowing owls. Do not apply within 270 yards (250 m) of known burrowing owl nests. Do not make more than 2 applications per season to potatoes, corn, and sunflower.

## Insects Controlled and Registered Crops:

**FURADAN 480F**

| CROP | INSECT |
|---|---|
| Potatoes | Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug |
| Corn | European corn borer |
| Sunflower | Sunflower beetle |
| Canola, mustard | Flea beetle, red turnip beetle |

**Application:** Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage.

## Precautions:

Of high acute mammalian toxicity. Highly toxic to bees, waterfowl, birds, fish and other wildlife. Poisonous by swallowing or inhalation. Do not breathe spray mist. Do not get in eyes. Wear goggles at all times. Use an approved respirator. Do not re-enter fields less than 48 hours following application, unless appropriate protective clothing is worn. (i.e. long-sleeved shirt and long pants).

## Hazard Rating:

☠ Danger Poison

# Imidan

## Company:

United Agri Products PCP# 23006

## Formulation:

50% phosmet formulated as a wettable powder in water soluble sachets.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Alfalfa | Alfalfa weevil, alfalfa blotch leafminer |
| Potatoes | Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid |

## Application:

Apply by ground only.

Imidan 50-WP instapak is packaged in water soluble sachets that are to be dropped into the spray tank unopened. Do not use in low-volume, gear-type spray equipment.

## How it Works:

Imidan is an organophosphate insecticide.

## Restrictions:

**Storage:** Keep sachets dry and do not allow sachets to contact any moist surface prior to adding to spray tank. Keep water soluble sachets in the protective container and store in a cool, dry place. Do not store at temperatures above 40°C.

## Precautions:

Harmful if swallowed, inhaled or absorbed through the skin. Wear protective clothing, including rubber gloves and goggles, during mixing, loading and spraying.

Imidan is toxic to fish and bees. Keep away from any body of water.

## Hazard Rating:

☠ Danger Poison

# Lannate

## Company:

E.I. duPont Canada PCP# 10868

## Formulations:

90% methomyl formulated as a water soluble powder. Container size: 24 x 225 gram water soluble bags.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Canola | Alfalfa looper, bertha armyworm, clover cutworm, beet webworm |
| Flax | Bertha armyworm |
| Peas | Alfalfa looper, pea aphid |
| Wheat, oats, barley | True armyworm, thrips |
| Potatoes | Aphids, leafhoppers, flea beetles, variegated cutworm |

## Application:

May be applied to canola, flax and cereals by air or ground equipment. Ground applications only to peas and potatoes. Apply when insects exceed threshold levels using sufficient water for good coverage.

Use higher rates for mature insects, dense canopy or when infestations are heavy. Early morning or late evening sprays are recommended.

When applied by air, pilot should not assist in mixing and loading operations. Apply a minimum of 22.5 L of water per ha (9.1 L/acre) for aerial application.

## How it Works:

Lannate is a carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short term residual. Rapid knockdown.

## Restrictions:

**Storage:** Do not store below 0°C. Store in original container away from other pesticides, fertilizer, food or feed.

**Others:** Sprays or drift must not contact workers, other persons or animals. The area being treated must be vacated by unprotected persons.

## Precautions:

Lannate is of high acute mammalian toxicity. May be fatal or cause blindness if swallowed. Poisonous if inhaled. Do not breathe vapours or spray mist. Do not get in eyes, on skin or on clothing.

Toxic to fish, birds and other wildlife. Keep out of any body of water. Do not apply where run-off is likely to occur. Do not allow to drift from treated areas. Highly toxic to bees exposed to direct application. Do not apply to areas being visited by bees. Time applications to coincide with minimum bee activity.

When mixing, loading or applying Lannate, wear protective clothing, goggles and an approved respirator. Wear clean clothes daily. Wash thoroughly after handling or applying.

## First Aid:

If swallowed, drink 1 to 2 glasses of water and induce vomiting. Get medical attention immediately. If inhaled, remove from exposure. If patient is not breathing, begin artificial respiration immediately. In case of contact, wash skin with plenty of soap and water. If in eyes, flush with water for 15 minutes. Remove and wash contaminated clothing before re-use. Atropine sulphate is an antidote.

## Hazard Rating:

☠ Danger Poison

# Lorsban/Nufos/Pyrinex/Chlorpyrifos

## Company:

Dow AgroSciences (Lorsban 4E - PCP# 14879)
United Agri Products (Pyrinex 4E - PCP# 23705)
Cheminova Inc. (Nufos 4E – PCP# 25831)
IPCO (Chlorpyrifos 480EC- PCP# 27479)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

## Formulations:

480 g/L chlorpyrifos formulated as an emulsifiable concentrate. Container sizes-10 L jug, 115 L returnable container, 208 L drum.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Barley, oats, wheat | Army, dark sided, pale western and redbacked cutworms; armyworms, grasshoppers |
| Wheat | Russian wheat aphid, brown wheat mite, wheat midge |
| Canola | Dark-sided, redbacked, variegated, pale western, and army cutworms; bertha army worm, alfalfa looper, armyworm, diamondback moth larvae, grasshoppers, lygus bug |
| Flax | Dark-sided, redbacked, variegated, pale western, and army cutworms, armyworm, bertha armyworm |
| Lentils | Pale western cutworm, grasshoppers |
| Sunflowers | Redbacked, pale western and army cutworms, sunflower seed weevil |
| Corn | Dark sided, black and redbacked cutworms |
| Potatoes | Colorado potato beetle (larvae), potato flea beetle, tarnished plant bug, red-backed cutworm, black cutworm, darksided cutworm |

## Application:

May be applied by air or ground equipment. Ground application only for redbacked cutworm control in corn and sunflower. Ground application only for potatoes. Uniform coverage of the crop is essential in aerial applications. Apply when insects exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for heavy infestations, mature insects, heavy crop canopy, or under dry soil conditions.

## How it Works:

Lorsban, Pyrinex, Nufos and Chlorpyrifos are broad spectrum, non-systemic insecticides. They work by contact, ingestion and vapour action (inhalation).

## Effects of Weather:

Avoid application under hot temperatures. Best results will be obtained when application is made in evening (after 7 p.m.) or morning (before 8 a.m.) - wheat midge and cutworms. Do not apply to plants under extreme drought stress or crop injury may occur.

## Tank mixes:

Lorsban and Nufos may be tank mixed with the following herbicides:

Avenge 200-C
Banvel plus 2,4-D amine
Buctril M
MCPA ester and amine
2,4-D amine and ester

When tank mixing always add the herbicide to the spray tank, then add Lorsban 4E. If Lorsban 4E is added first, settling out may occur causing plugging of lines or nozzles.

## Restrictions:

**Grazing:** Treated cereals grown for cover crop should not be used for human or animal consumption within 60 days of harvest.

**Storage:** Combustible. Do not store near heat or flame. Do not store with food, feed, drugs or clothing.

**Others: Potatoes** - Do not make more than 9 applications on potatoes per season.

**Wheat, barley, oats** - Do not make more than 2 applications or more than a total of 96 ml/acre per season.

## Precautions:

Lorsban 4E, Pyrinex 480 EC, Nufos 4E and Chlorpyrifos 480EC have a high acute mammalian toxicity. Very toxic to bees, fish, birds, aquatic organisms and other wildlife. May be fatal if swallowed. Causes substantial but temporary eye injury. Harmful if absorbed through skin. May cause skin or eye irritation. Wear protective clothing, impervious gloves and goggles. Wash thoroughly with soap and water after handling and applying. Immediately remove contaminated clothing and wash before re-use. Do not apply or allow to drift on to workers or other persons.

Do not apply directly to water or where runoff could occur to adjacent aquatic sites. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Avoid use when bees are actively foraging

## Hazard Rating:

☠ Danger Poison

# Malathion

## Company:

United Agri Products (Malathion 500E - PCP# 4709)

IPCO (Malathion 500 - PCP# 5821)

Different companies produce malathion. Note differences in label registrations and recommendations. Check your label for more information.

## Formulations:

500 g/L malathion formulated as an emulsifiable concentrate.

## Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for heavy infestations, dense canopy or mature stages of insects.

## Insects Controlled and Registered Crops:

| CROP OR STRUCTURE | INSECT |
|---|---|
| Alfalfa, clover | Grasshopper (young), aphid, lygus bug, alfalfa weevil larvae, leafhoppers, alfalfa blotch leafminer, spider mites |
| Canola, mustard (500E only) | Flea beetle, diamondback moth, grasshopper (young) |
| Wheat, barley, oats, rye | Grasshopper (young), aphid, true armyworm |
| Potatoes | Colorado potato beetle, leafhopper, aphid, spider mites |
| Canaryseed | Aphids |
| Sweet clover | Sweet clover weevil |
| Flax, lentils, hay, pasture | Grasshopper (young) |
| Corn (grain, forage) | Earworms, European corn borers |
| Beans, peas | Aphids, leafhoppers, spider mites |
| Empty grain bins, grain elevators, grain box cars, flour mills | Confused flour beetles, flat grain beetles, granary weevils, grain mites, Indian meal moths, lesser grain borers, red flour beetle, rice weevils, rusty grain beetles, sawtoothed grain beetles |

## How it Works:

Malathion is a non-systemic, contact, organophosphate insecticide and acaricide of brief to moderate persistence. Generally non-phytotoxic.

## Effects of Weather:

For best results apply when daytime temperatures are above 20°C.

## Restrictions:

**Grazing:** When spraying forages and pastures, cattle should be removed and returned after spraying.

**Storage:** Do not store near food or feed. Store in a cool dry place but not below -10°C. Protect from heat.

**Others:** Do not apply to any plant in bloom. Apply to crops when bees are absent from field. Avoid contact with automobile paint and wash immediately if exposure occurs.

## Precautions:

Malathion has a low acute mammalian toxicity. Highly toxic to bees and fish. Wear protective clothing to reduce skin and eye exposure.

## Hazard Rating:

▽ Caution Poison

# Matador

## Company:

Syngenta Crop Protection. (PCP#24984)

## Formulations:

120g/L cyhalothrin-lambda formulated as an emulsifiable concentrate

Container size - 4 x 3.78 L.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potatoes | Colorado potato beetle, potato flea beetle, potato leafhopper, tuber flea beetle, Lygus bugs |
| Canola, mustard | Crucifer flea beetle, grasshoppers, Lygus bug, cabbage seedpod weevil (adults), cabbage looper, diamondback moth larvae, imported cabbagworm, Bertha armyworm |
| Sunflower | Sunflower beetle |
| Wheat, barley, oats | Grasshoppers |
| Unimproved pasture, summerfallow, alfalfa | Grasshoppers |
| Flax | Grasshoppers |
| Alfalfa | Alfalfa weevil, Lygus bugs, pea aphid, potato leafhopper |

| CROP | INSECT |
|---|---|
| Corn | European corn borer, corn earworm, fall armyworm, cutworms |
| Beans | Cutworms, corn borer, potato leafhopper, Lygus bugs |
| Chickpeas | Grasshoppers, potato leafhopper, cutworms |
| Favabeans (broad beans) | Lygus bugs, potato leafhopper, pea aphid |
| Lentils | Cutworms, grasshoppers, Lygus bugs, pea aphids, potato leafhopper |
| Peas | Cutworms, grasshoppers, pea aphids |
| Soybeans | Cutworms, grasshoppers, Lygus bugs, soybean aphids |

## Application:

**Aerial:** ***Canola, mustard, sunflower, flax, alfalfa, unimproved pasture, summerfallow*** - Do not make more than 1 application at the 33.2 ml/ac rate per year.

***Corn, wheat, barley, oats, potatoes*** – Do not make more than 2 applications of the 33.2 ml per acre rate per year.

**Ground:** ***Canola, mustard, sunflower, flax, alfalfa, unimproved pasture, summerfallow potatoes, corn, wheat, barley, oats*** – Do not make more than 3 applications per year at the 33.2 ml/ac rate. Do not make more than 2 applications per year if using the 50 ml/ac rate.

***Beans, chickpeas, favabeans, lentils, peas, soybeans*** – Do not make more than 3 applications per year. Do not graze or harvest treated forage straw or hay for livestock feed.

## Timing:

For potato insects, timing of application should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring.

For sunflower beetles, use the high rate to control adults.

For flea beetles, to prevent migration of overwintering adults throughout the field, spray a 15 m strip around the field at the first sign of flea beetle feeding.

For grasshoppers, apply the low rate when grasshoppers are up to the 3rd nymphal stage (up to 1 cm in length) or when insect numbers are low. Apply the high rate when insects are larger, up to but not including, winged adults or when insect numbers are high.

For corn borer control apply Matador before the larva bores into the plant stalk or pods

## How it Works:

Matador is a synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide effective against a broad spectrum of foliar pests. It has no fumigant or systemic activity.

## Effects of Weather:

For best results, apply Matador 120 EC during the early morning before temperatures rise, and during the evening, past the heat of the day.

## Tank Mixes:

Ground applications to registered crops only.

**Herbicides:**
Horizon
Achieve

**Fungicides:**
Tilt.

**Note: The above mixes are those listed on the Matador label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

## Restrictions:

**Grazing:** Do not graze or feed lactating dairy animals on treated green cereal forage or treated pasture. Do not apply within 14 days of livestock foraging.

**Storage:** Store above 0°C. Storage below 0°C will not impair the effectiveness of Matador 120 EC, however, following such storage, agitate well before use.

**Others:** Allow a 7-day interval between applications. Do not apply within 15m of productive fisheries, water or waterfowl habitat.

## Precautions:

Matador has potential for skin and eye irritation. Avoid splashing in eyes or on skin, particularly the face. If hands are contaminated, wash with soap and water before touching other areas of skin. This product is very toxic to bees. Avoid spraying when bees are foraging. Spray deposits should be dry before bees commence foraging in treated crops.

## Hazard Rating:

☠ Danger Poison

# Monitor

## Company:

Bayer CropScience, United Agri Products PCP# 12287

## Formulations:

480 g/L methamidophos formulated as a liquid. Container size-10 L pail.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Canola | Bertha armyworm, grasshoppers |
| Potatoes | Colorado potato beetle, potato flea beetle, potato leafhopper, aphids |

## Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for mature stages of insects, dense canopy or heavy infestations.

## How it Works:

A broad spectrum organophosphorous insecticide and acaricide which works by contact and systemic action. Contact effectiveness may persist for 7 to 21 days.

## Restrictions:

**Storage:** Store in a cool, dry place but not below -10°C. Do not store near food or feed. Protect from heat.

**Others:** Only 2 applications per season may be made on canola for Bertha armyworm and grasshoppers. Highly toxic to bees exposed to direct treatment or residues on crops. Avoid use during flowering and pollination periods. Do not contaminate any bodies of water.

## Precautions:

Monitor is of high acute mammalian toxicity and is extremely toxic to fish, wildlife and bees. Poisonous if swallowed, inhaled or absorbed through skin. Rapidly absorbed through skin. Wear an approved respirator, natural rubber gloves, protective clothing and goggles. Wash hands, arms and face with soap and water after handling and applying. Wash all contaminated clothing with soap and hot water before re-use. Keep unprotected persons out of operating or spray areas or where drift could occur.

Do not re-enter treated areas until drifting insecticide and volatile residues have dissipated. Do not store or transport with feed or food.

## Hazard Rating:

☠ Danger Poison

# Orthene

## Company:

Distributed by United Agri Products PCP#14225

## Formulation:

75% acephate as a water soluble powder. Container size-case of 12 x 1.5 kg

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potatoes | green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug |

## Preharvest Interval

Do not apply within 21 days of harvest.

## Application:

Apply with conventional ground equipment only. Do not apply by air.

Apply only when insects exceed economic thresholds.

Use higher rate only for heavy infestations.

## How it Works:

Acephate is an organophosphate systemic insecticide that works through contact and as a stomach poison.

## Effects of Weather:

Do not apply if rainfall is expected within 48 hours after application. Treatment areas should not be irrigated for at least 48 hours after application.

## Restrictions:

**Storage:** Store in cool, dry place, in the original container away from food or feed. Protect from excessive heat.

**Environment:** Orthene has the potential to leach through soils to ground water. It is recommended that Orthene is not used on coarse textured soils or in areas where the water table may be high.

Do not feed foliage to livestock or allow animals to graze on treated areas.

Do not make more than 4 applications per season.

**Others:** Orthene is not registered in the United States. Therefore Orthene should not be used on any produce destined for markets in the United States.

## Precautions:

Orthene is toxic to birds and mammals.

Orthene is toxic to aquatic invertebrates. Do not apply where runoff or drift is likely to occur.

Orthene is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging in the treatment area. Beekeepers should be warned to protect bees from treated areas for one week after treatment.

## First Aid:

If swallowed, induce vomiting and obtain medical attention or call a poison control centre immediately. In case of contact with skin, wash with soap and water. If in eyes, flush with water. See a physician if eye irritation persists. Atropine is an antidote.

## Hazard Rating:

Caution Poison

# Pounce

## Company:

Distributed by United Agri Products PCP#16688

## Formulations:

384 g/L permethrin formulated as an emulsifiable concentrate. Container size-1 L (12 x 1L).

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Cereals, canola, corn, flax, lentils, peas, potatoes, sunflowers | Cutworms |
| Potatoes | Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug, variegated cutworm |

## Application:

Apply Pounce by ground only. Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for heavy infestations, adult insects and dense foliage. For cutworm control application should be made under warm, moist conditions in the evening or at night. Use high rates if larvae are near maturity or soil conditions are dry. Do not disturb soil surface for five days after treatment.

## How it Works:

Pounce is a synthetic pyrethroid insecticide. It is a stomach and contact insecticide with no systemic or fumigant effects.

## Restrictions:

**Grazing:** Cover crops or crops treated with Pounce should not be used as a green feed for animals.

**Storage:** Store above 0°C.

**Others:** Observe a 16 yard (15 m) setback distance for ground and 110 yard (100 m) setback distance by air near water bodies or other sensitive areas.

## Precautions:

Pounce is of low acute mammalian toxicity. Both are very toxic to bees and fish. Do not contaminate ponds, lakes or streams while filling sprayer or spraying. Avoid spraying when bees are foraging.

## Hazard Rating:

☠ Caution Poison

# Ripcord

## Company:

BASF Canada PCP#15738

## Formulation:

407 g/L cypermethrin formulated as an emulsifiable concentrate.

Container size-1 L

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Wheat, barley | Grasshoppers, cutworms |
| Canola | Grasshopper, flea beetle, bertha armyworm |
| Roadsides, headlands, summerfallow | Grasshopper |
| Sunflower | Sunflower beetle, sunflower seed weevil |
| Corn | European corn borer, cutworms, corn earworm |
| Potatoes | Colorado potato beetle, flea beetle, leafhopper, tarnished plant bug, cutworms |

## Application:

Ripcord may be applied by ground application only for control of grasshoppers on wheat, barley, roadsides, headlands and canola; for flea beetle control on canola; and for control of cutworms.

Ripcord may be applied by ground or air for bertha armyworm, sunflower beetle, sunflower seed weevil, corn earworm, European corn borer and Colorado potato beetle, flea beetle, leafhoppers and tarnished plant bug on potatoes. Only 1 aerial application is permitted per season for bertha armyworm on canola and sunflower beetle and seed weevil on sunflower, and 2 applications per season for corn and potatoes.

Observe a 16 yard (15 m) setback from water bodies and other sensitive areas when applying Ripcord with ground application. Observe a 110 yard (100 m) setback from water bodies and sensitive areas when applying by air.

Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for mature insect stages (grasshoppers) or severe infestations.

## How it Works:

Ripcord is a pyrethroid insecticide that works as a contact and stomach poison.

## Effects of Weather:

Activity of Ripcord on grasshoppers is reduced as soil temperature increases. Application for grasshopper control should be made at temperatures below 25°C. Spraying for grasshoppers should be delayed until evening if daytime temperatures are above 25°C.

## Restrictions:

**Grazing:** Treated crops must not be grazed or cut for hay.

**Storage:** Keep in original container during storage. Do not contaminate or store near foodstuffs.

## Precautions:

Ripcord is of low to moderate acute mammalian toxicity and very toxic to bees, fish, and aquatic organisms. Harmful or fatal if swallowed. May be harmful if absorbed through skin.

Severely irritating to eyes. Causes skin irritation and sensitization. Wear long-sleeved protective clothing and gloves when handling or applying. Wear face shield or goggles when mixing. Do not apply where streams, lakes and ponds may be contaminated. Avoid spraying when bees are foraging.

## Hazard Rating:

Caution Poison

# Sevin XLR / Sevin XLR Plus

## Company:

Bayer CropScience
PCP#: 27876 (Sevin XLR); 19531 (Sevin XLR Plus)

## Formulation:

466 g/L carbaryl formulated as a liquid suspension (Sevin XLR)

480 g/L carbaryl formulated as a liquid suspension (Sevin XLR Plus).

Container size -10 L.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Canola | Flea beetle |
| Alfalfa, clover | Grasshopper, blister beetle, Leafhoppers, alfalfa caterpillar, armyworm |
| Barley, oats, rye, wheat | True armyworm, grasshopper |
| Ditchbanks, field borders, forage grasses, headlands, pastures, rangelands, rights-of-way, wastelands | Grasshopper |
| Corn | European corn borer, corn earworm, fall armyworm, grasshopper |
| Potatoes | Colorado potato beetle, flea beetle, leafhopper, European corn borer, climbing cutworms |
| Beans | Leafhoppers, lygus bugs, climbing cutworms |

## Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use lower rates on young plants and early stages of insects and higher rates on mature plants and advanced stages of insects, or mature insects.

Sevin XLR Plus applications are more resistant to wash-off when applied as a concentrated suspension. To ensure wash-off resistance is retained, apply dilutions of 1 part Sevin XLR Plus to no greater than 39 parts water. For example, if applying 1 L/ac of Sevin XLR Plus, do not exceed 40 L/ac total application volume. Applications should be made to dry foliage to maximize wash-off resistance.

## How it Works:

A carbamate insecticide that works by contact (approx. 20%) and ingestion (approx. 80%). Moderate to rapid in speed of action with short to moderate residual activity (2 to 4 weeks).

## Restrictions:

**Storage:** Do not store in areas where temperatures frequently exceed 38°C. Store in original container in a cool dry area out of reach of children and animals and away from food and feed.

**Grazing:** Remove cattle from area when spraying. Crops may be grazed or harvested for feed: Dairy animals-48 hours after treatment; Meat animals-24 hours after treatment.

## Precautions:

Sevin is of moderate acute mammalian toxicity. This product is highly toxic to honeybees exposed to direct treatment on blooming crops or weeds. Harmful if inhaled or swallowed. Avoid contact with skin and eyes. Wear long-sleeve work clothing and change to clean clothing daily. Wash hands and face after handling. Avoid contamination of food, feed, water supplies, streams and ponds.

## Hazard Rating:

◈ Warning Poison

# Success 480 SC

## Company:

Dow AgroSciences PCP# 26835 (Supplemental)

## Formulation:

480 g/L spinosad formulated as a suspension concentrate
Container size-1L jug

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potatoes | Colorado potato beetle larvae and European corn borer larvae |
| Sweet corn | European corn borer |

## Application:

Apply Success 480 SC as a foliar spray by ground only. Do not apply by air. Apply when scouting indicates the target pest species have reached economic threshold levels. For Colorado potato beetle, target eggs at hatch or small larvae. For control of European corn borer, time the application to coincide with peak egg hatch. Use higher application rate for higher pest pressure or when extended egg hatch is anticipated. If pest populations persist, a repeat application 7 to 10 days after the initial application may be necessary.

## How it Works:

Success 480 SC is in the spinosyn class of insecticides. It is a contact and stomach insecticide. It is derived from the fermentation of *Saccharpolyspora spinosa*.

## Effects of Weather:

This product has the potential for run-off. Do not spray immediately after a rainfall or if rain is forecast within 48 hours after application.

## Restrictions:

**Storage:** Avoid freezing. Do not store or ship with food, feeds, drugs or clothing.

**Others:**

Potatoes - Do not apply more than a maximum seasonal rate of 100 ml/acre.
Sweet corn - Do not exceed 33 ml/acre per application - maximum of 2 applications per season.
Do not apply within 7 days of harvest. Do not apply within 28 days of fodder harvest or within 7 days of forage harvest.

## Precautions:

Success 480 SC is highly toxic to honey bees exposed to direct spray. Avoid spraying on crops in bloom or other vegetation when bees are actively foraging. This product is toxic to other beneficial parasites and predators. Do not contaminate aquatic habitats such as ponds, lakes, rivers, streams and wetlands during application or when rinsing equipment and containers. A buffer zone of 2 metres (early season) or 1 metre (late season) is required between downwind edge of spray boom and sensitive aquatic habitats. Avoid contact with eyes, skin, and clothing.. Do not enter or allow worker entry into treated areas for a period of 4 hours after application.

## Hazard Rating:

Caution Poison

# Thimet 15G

**This product will no longer be available for potatoes after December 31, 2006**

## Company:

BASF Canada PCP# 10532

## Formulations:

15% phorate formulated as a granular.
Container size-20 kg bag.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potatoes | Aphids, leafhoppers, reduction of potato flea beetle and wireworm damage, and early season control of Colorado potato beetle |

## Application:

Ground application at seeding time: Distribute granules evenly in furrow or granules may be banded on each side of the row at planting time. Use low rate for sandy or light soils and high rate for silt or heavy soils. Works as a systemic poison with effective initial residual activity on soil and foliar insects.

## How it Works:

An organophosphate insecticide that works as a systemic poison, with effective initial residual activity on soil and foliar insects.

## Restrictions:

**Storage:** Do not store in or around the home. Store away from food or feed. Store open bags in labelled sealed drum or heavy plastic bags.

**Others:** Do not use in muck soils. Do not apply later than a planting time. Will provide reduction of potato flea beetl and wireworm damage and early season potato beetl control.

## Precautions:

Thimet is of high acute mammalian toxicity and is highl toxic to fish, birds and other animals. Do not allo product to contact eyes and skin. Poisonous by ski contact, inhalation or swallowing. Repeated inhalatio or skin contact with Thimet 15G, other organophosphorus or carbamate insecticides may, without symptoms progressively increase susceptibility to poisoning. Wea freshly-laundered, long-sleeved work clothing daily. Us rubber gloves when transferring from package to equipment. Sleeve cuffs should be worn over gloves to preven granules from falling into the gloves. Rubber gloves shoul be washed with soap and water after each use. Destroy an replace gloves frequently. In case of contact, immediatel remove contaminated clothing and wash skin thoroughl with soap and water. While emptying bags into equipment pour downwind and allow as little free fall as possible. Th use of a dust mask is recommended.

## Hazard Rating:

☠ Danger Poison

# Thiodan/Thionex

## Company:

Bayer CropScience (Thiodan 4EC- PCP# 15747)

Makhteshim-Agan of North America Inc. (Thionex 4EC-PCP# 23453) distributed by United Agri Products

United Agri Products (Thionex 50W- PCP#14617)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

## Formulation:

Thiodan/Thionex-400 g/L endosulfan formulated as an emulsifiable concentrate. Container size-10 L

Thionex 50W-50% endosulfan formulated as a wettable powder. Container size-1 kg.

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potato | Aphid, Colorado potato beetle, flea beetle, leafhopper |
| Sunflower | Sunflower beetle |
| Beans | Aphids, potato leafhoppers |

## Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage.

## How it Works:

Organochlorine insecticides that work as contact and stomach poisons.

## Tank Mixes:

Compatible with most commonly used insecticides and fungicides, except Bordeaux mixture and hydrated lime.

## Restrictions:

**Grazing:** Do not feed treated crop residue to livestock.

**Storage:** Do not store below freezing. If stored one year or longer, shake well before using.

**Others:** On sunflowers, do not make more than 1 application per season.

## Precautions:

Thiodan/Endosulfan/Thionex is of high, acute mammalian toxicity and is toxic to bees. Highly toxic to fish. Hazardous if swallowed, inhaled or absorbed through the skin. Wear synthetic rubber gloves and approved respirator in prolonged spray-mixing and loading operations. Do not apply or allow spray drift to areas occupied by unprotected persons and animals or onto streams, lakes or ponds.

## Hazard Rating:

☠ Danger Poison

# Vydate L

## Company:

E.I. duPont Canada (PCP# 17995)

## Formulation:

240 g/L oxamyl

Container size – 10 L jugs

## Insects Controlled and Registered Crops:

| CROP | INSECT |
|---|---|
| Potatoes | Colorado potato beetle, flea beetles, aphids, potato leafhopper, Lygus bugs |

## Application:

Apply Vydate as a foliar spray by ground only. Apply sufficient volume of spray solution to thoroughly wet foliage. Make application when insects appear at economic levels. Repeat weekly as required. Use higher rate for severe infestations or if aphids are the primary pest species.

Do not apply within 7 days of harvest.

Do not apply directly to water. Do not apply where run-off is likely to occur. Do not apply when weather conditions favour drift to untreated areas and when wind speed exceeds 10 km/hr.

## How it Works:

Vydate is a carbamate insecticide that works by contact and ingestion.

Vydate will not control Colorado potato beetles resistant to other carbamate insecticides.

## Restrictions:

**Storage:** Avoid freezing. Do not store or transport with food, feeds, drugs or clothing.

## Precautions:

Vydate is toxic to fish, birds and other wildlife.

Vydate is toxic to honey bees exposed to direct spray and should not be used when bees are active in the treatment area. Avoid contact with eyes, skin, and clothing.

## Hazard Rating:

☠ Danger Poison

# Insect Control in Stored Grain

## Prevention

**Clean in and around storage facilities.** Storage and transportation facilities, and the area around storage facilities, should be cleaned thoroughly prior to transporting and storing grain. Moving and storing the grain in clean facilities will eliminate one source of infestation. However, grain stored for long periods of time still has the potential for renewed infestations.

Depending on the commodity to be stored, storage facilities may additionally be sprayed or dusted, if needed, with a recommended insecticide before storing grain in the bin (e.g. malathion, diatomaceous earth or cyfluthrin – refer to product labels for details).

**Note** – some commodities, such as canola, should not be stored in facilities recently treated with malathion.

**Dry and Cool Grain.** Ideally, the grain should be dry before being put into storage, and cooled as quickly as possible. For long-term storage, producers are urged to lower the grain temperature below 15°C as soon as possible after the grain is placed in storage. At 15°C the stored product insects stop laying eggs and development stops. Aeration systems used during the night immediately after harvest should have the grain below 15°C in about 2 weeks. Grain that is not moved or aerated after harvest can remain warm enough to allow insects to survive the winter. Convection currents arising from this warm air can also promote condensation, sprouting (heating) and mould growth in unmanaged grain. These conditions are very attractive to stored product pests and support their development.

## Monitoring for Insects

Regular monitoring of the stored grain is the next step in determining the presence and potential for serious infestations. Either the presence of insects or damaged kernels will give an indication of a problem. Probably the most sensitive means of detecting insects in stored grain is through the use of probe traps, available from numerous crop protection agents. Often the first indication of an infestation will be found near the top centre of a storage bin, and therefore, this is where traps should be placed. Monitoring should take place once every 7-10 days during the onset of storage (1st 60 days) and then the frequency of monitoring may be adjusted.

## Identifying insects in stored grain

Correct identification of insects found in stored grain is important in determining the most appropriate control methods. Some of the insects found in stored grain feed on the grains, while others feed on fungus that may be developing in the stored grain.

### Grain feeders:

Insects that feed on the grain include rusty grain beetles, red flour beetles, and saw-toothed grain beetles.

The **rusty grain beetle** is the most common stored product insect. Heavy infestations of this insect cause grain to heat and spoil.

The **red flour beetle** is the another common insect pest of stored grain in the prairies. Red flour beetles cannot feed on undamaged, dry seed with less than 12% moisture content. They prefer grain dust, broken grain and milled stocks. Red flour beetles can be controlled by moving grain, whether or not it is cold.

**Saw-toothed grain beetles** are more common in stored oats than in stored wheat and barley.

### Fungus feeders:

Insects that feed on fungus in the grain bin include the foreign grain beetle, hairy fungus beetle, psocids, and grain mites.

**Foreign grain beetles** resemble the rusty grain beetle, but can be distinguished from it by club-shaped antennae. Also, when placed in a glass jar, foreign grain beetles will climb up the sides, while rusty grain beetles cannot. While foreign grain beetle is considered a fungus feeder, they will feed on grain if the moisture content is in the high end of the acceptable range (eg. 14.5% mc wheat).

**Grain mites** are whitish, about 0.2 to 0.5 mm long, and can be hard to see with the naked eye. About eight kinds of mites are common in farm granaries and elevators.

**Psocids** are soft-bodied insects, about 1 mm long, with long antennae relative to the body size.

Fungus feeding insects and mites cannot survive in dry grain. Chemical control is not necessary for fungus feeding pests in stored grain. Practices that result in the grain drying may be all that is needed to control such pests.

Information to help identify insect pests of stored grain can be found at: http://res2.agr.ca/winnipeg/storage/pages/princ_e.htm.

## Control Techniques:

The Canada Grain Act states there is zero tolerance for any primary insects (those that feed on whole, sound grain) in grain delivered to elevators. Outlined below are some control techniques and when and how these techniques can be best used.

**Cold Temperatures.** Rusty grain beetles are cold hardy and can survive subzero temperatures. Rusty grain beetles and other stored grain insects can be killed by reducing core grain temperatures as follows:

**Time Required to Kill Insects at Various Grain Temperatures**

| Grain Temperature | Time required to kill insects |
|---|---|
| -5°C | 12 weeks |
| -10°C | 8 weeks |
| -15°C | 4 weeks |
| -20°C | 1 week |

Cooling the grain, through aeration or moving the grain several times during mid-winter, should provide effective control of rusty grain beetles.

**Moving Grain with Pneumatic Conveyors.** Moving the grain using pneumatic conveyors (grain vacs) has also been shown to be an effective means of controlling free-living insects in stored grain.

## Phostoxin

**Company:** Degesch America Inc. (Phostoxin)

**Formulation:** 55% aluminum phosphide.

| Formulation | Primary Use | Container Size |
|---|---|---|
| Phostoxin tablets (3g each) | On the farm or country elevator | 500 tablets |
| Phostoxin pellets (0.6g each) | In terminals | 2500 pellets |
| Phostoxin tablets prepac | Containers | 4 strips of 33 tablets to a pouch |

**Insects controlled:** Rusty grain beetle, red flour beetle, saw-toothed grain beetle, granary weevil, Indian meal moth and yellow mealworm.

**Approved for use on the following stored grains:** Barley, corn, dried peas, lentils, oats, rice, rye, soybeans, sunflower seeds, triticale and wheat.

**Restricted Product:** The use and sale of Aluminum Phosphide (Phostoxin) is restricted to licensed pesticide applicators possessing a valid fumigation licence (Saskatchewan) or stored agricultural products license (Manitoba).

**Rate and Minimum Exposure Period:** Refer to labels to determine rate. For grain bins a dosage of 250-500 tablets (or 880-2560 pellets) per 100m$^3$ of bin space being treated (not volume of grain) is recommended. It is important to ensure that bins are relatively secure. It is not advisable to use phosphine products in bins that are leaky or not well sealed.

The following table may be used as a guide to determine the minimum length of exposure period to phostoxin at the indicated temperatures:

| Temperature | Exposure Period |
|---|---|
| Below 5°C (40°F) | Do not fumigate |
| 5°C-12°C (40°-53°F) | 10 days |
| 13°-15°C (54°-59°F) | 5 days |
| 16°-20°C (60°-68°F) | 4 days |
| above 20°C (68°F) | 3 days |

If the grain is less than 5°C then the tablets will not release the gas until the grain temperature warms up. This may result in poor control and accidental exposure to phostoxin at a later date in grain handling facilities. Very dry grain will also slow the release of the gas from the pellets. A shortened exposure period cannot be compensated for by increased dosage. Also ensure that storage is well ventilated for at least 24 hours after the required time for fumigation.

**Cost:** $75/500 tablets; $75/2500 pellets; $45/pouch (132 tablets/pouch)

## Protect-It, Insecto

**Company:** Hedley Technologies Inc. (Protect-It) PCP#24259; Natural Insecto Products Inc. (Insecto) PCP#22489

**Formulation:** 90 percent Diatomaceous Earth (DE)

**Insects controlled:** Rusty grain beetle (Protect-It only), rice weevil, granary weevil, Angoumois grain moth, Mediterranean flour moth, Indian meal moth, red flour beetle and Tribolium.

**Approved for use on the following stored products:** Feed grains, seed, stored grains, wheat, barley, buckwheat, corn, oats, rye, flax, peas, soybeans and sorghum. Also registered for structural treatment of empty grain storage and transportation containers.

**How it works:** Diatomaceous earth damages the cuticle of the insect, reducing the insect's ability to retain moisture. The insect eventually dies from dehydration.

**Rate, for empty storage structures:** Use a dust blower or aeration fan to get diatomaceous earth into the cracks, crevices and void spaces of the structure being treated. Dust areas at a rate of 1 kg per 200 square metres (5 g/m$^2$).

**Rate, while grain is being placed into storage:** Protect-It; The application rate for Protect-It varies by crop and insect species, ranging from 100 g/tonne for control of rusty grain beetle in wheat to 1000g/tonne for red flour beetle in corn. Refer to the label for details. Insecto; Apply to grain at the time of storage at a rate of 0.5 to 1 Kg per metric ton of grain (500-1000 ppm).

**Cost:** Protect-It - $10.40/kg. Insecto - $8.69/kg.

**Precautions:** The application of DE will lower the test weight measurement of the grain, but usually not to the point of downgrading. If test weight loss is excessive, the grain can be diluted with untreated grain. DE is non-toxic to humans and animals.

## Malathion Grain Protectant Dust

**Company:** Interprovincial Co-operative PCP# 17222

**Formulation:** 2% malathion

**Insects controlled**: confused flour beetles, flat grain beetles, granary weevil, Indian meal moth, lesser grain borer, rusty grain beetle and sawtoothed grain beetle.

**Approved for use on the following stored grains:** Wheat, rye, barley and oats as stored grains.

Malathion Grain Protectant can be applied to grain as it is being loaded into a bin or being turned by adding gradually at the grain auger. It can also be used to control surface infestations by applying to the grain surface and raking in to 15 cm depth of the grain. Malathion controls insects by ingestion and contact and insects must be active for it to be effective.

**Rate and Cost:**

| Crop | Rate-g/1000 kg (tonne) grain | Cost/1000 kg grain |
|---|---|---|
| Wheat | 415 | $1.19 |
| Rye | 450 | $1.29 |
| Barley | 520 | $1.49 |
| Oats | 735 | $2.10 |

Do not apply to grain within 7 days of sale.

Be aware that the Canadian Grain Commission allows only 8 ppm of malathion residues in stored grains.

## Malathion 500, Malathion 500 E

Refer to labels for these products for insect and mite control in *empty* grain bins, grain elevators, grain box cars and flour mills.

**Note** - some commodities, such as canola, should not be stored in facilities recently treated with malathion.

## Malathion 500 (IPCO)

| Insect | Rate | Cost | Note |
|---|---|---|---|
| Rusty grain beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer **(empty grain bins)** | 250-300 ml/5 L of water on 100 m$^2$ | $3.16-$3.80/ 100 m$^2$ | May be used within 1 day of grain storage |

## Malathion 500E (United Agri Products)

| Insect | Rate | Cost | Note |
|---|---|---|---|
| Rusty grain beetle, red flour beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer, flat grain beetles, rice weevils **(empty grain storage facilities)** | 333 ml/5L of water on 100 m$^2$ | $4.10/ 100 m$^2$ | Wait until spray has thoroughly dried before storing grain in treated areas. |

## Tempo 20 WP

**Company:** Bayer CropScience PCP# 25673

**Formulation:** 20% cyfluthrin. Tempo is a group 3 (pyrethroid) insecticide.

**Application:** Tempo can be used to control insects in grain storage facilities, truck beds and other areas where grain is stored *before filling these areas with grain*. Cleaning of all areas prior to use of Tempo 20 WP insecticide will increase levels of control. See the insecticide label for specific mixing instructions.

**Additional information on controlling insects in stored grain can be found at: http://res2.agr.ca/winnipeg/storage/pages/smmry_e.htm**

# Notes

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# 2006 Forage Crops Chart – Recommended Herbicides

| CROPS AND WEEDS | | CROPS (S = seedling only; E = established only; X = seedling or established) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GRASSES | | | | | | | | | | | | | | | | | | | | | LEGUMES | | | | | | | | COVER CROPS | | | | | GRASSES | | | | | | | | | | | | | | | | | | | | |
| HERBICIDES | Weed Resistance Grouping | Annual Ryegrass | Altai Wild Rye Grass | Bromegrass | Creeping Red Fescue | Crested Wheatgrass | Intermediate Wheatgrass | Kentucky Bluegrass | Meadow Fescue | Meadow Foxtail | Millets | Northern Wheatgrass | Orchardgrass | Pubescent Wheatgrass | Reed Canarygrass | Russian Wild Ryegrass | Slender Wheatgrass | Streambank Wheatgrass | Tall Fescue | Tall Wheatgrass | Timothy | Western Wheatgrass | Alfalfa | Alsike Clover | Cicer Milkvetch | Red Clover | Sainfoin | Sweet Clover | Trefoil, Bird's-foot | White Dutch Clover | Barley | Flax[10] | Oats | Canola | Wheat | Barnyard Grass | Foxtail Barley | Foxtail, Green | Foxtail, Yellow | Quackgrass | Wild Oats | Bindweed, Field | Bluebur | Buckwheat, Wild | Burdock | Catchfly, Night-flowering | Chickweed | Cleavers | Cockle, Cow | Cocklebur | Dandelion | Dock, Curled | Flixweed | Goat's-beard | Goosefoot, Oak-leaved | Hawk's beard, Narrow-leaved |
| ☠ 2,4-D[8] | 4 | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | S | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | | | | | | | | | X | | | | X | | | | | | | | ● | | ● | | | | | ● | ☐ | ● | ●g | ● | ● | ●g |
| ☠ 2,4-DB[8] | 4 | | | S[4] | S[4] | S[4] | S[4] | | S[4] | | | | S[4] | | | | | S[4] | S[4] | S[4] | S[4] | | S | S | | S | | | S | S | X | | X | | X | | | | | | | ☐ | | ● | | | | | | | ☐ | S | | | ● | ● |
| — ACHIEVE LIQUID | 1 | | | X[2] | X[2] | X[2] | X[2] | | | | | S[2] | | | | | S[2] | | | | | S[2] | S[1] | S[1] | | S[1] | S[1] | S[1] | S[1] | S[1] | X | | | | X | ● | | ● | ● | | ● | | | | | | | | | | | | | | | |
| ▽ ALLY | 2 | | | | X[2] | X | X | | | | | | X | | | | | | | | | | | | | | | | | | X | | | | X | | | | | | | | ● | S | | | ● | | ● | | | | ● | | | |
| ▽ ASSERT | 2 | X[2] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | | S | | | | | | | | | | | | |
| — ASSURE II | 1 | | | | X[2] | | | | | | | | | | | | | | | | | | X[2] | S[2] | | S[2] | S[2] | S[2] | S[2] | S[2] | | X | | X | | ● | | ● | | | ● | | | | | | | | | | | | | | | |
| ☠ ATTAIN | 4 | | | X[2] | X[2] | X[2] | X[2] | | | | | | | | | | | | X[2] | | X[2] | | | | | | | | | | | | | | | | | | | | | ☐h | ● | ● | ● | | S | ● | | ● | ●g,h | ●h | ● | ● | ●h | |
| ◈ AVADEX BW | 8 | | | | | | | | | | | | | | | | | | | | | | S[1] | S[1] | | S[1] | | S[1] | S[1] | | X | X | | X | X | | | | | | ● | | | | | | | | | | | | | | | |
| ◈ AVENGE | 8 | | | S[1] | S[1] | S[1] | | S[1] | S[1] | | | | S[1] | | S[1] | S[1] | | | | | S[1] | | S[1] | | | S[1] | | S[1] | S[1] | | X | | | | X[10] | | | | | | ● | | | | | | | | | | | | | | | |
| ◈ BASAGRAN | 6 | | | S[2] | S[2] | S[2] | | | | S[2] | S | | S[2] | | | | | | | | S[2] | | X[2] | S[2] | | S[2] | S[2] | E[2] | | | | X | | | | | | | | | | ☐ | | | | | ● | ● | | ● | | | | | | |
| ◈ BROMOXYNIL[8] | 6 | | | S[2] | S[2] | S[2] | S[2] | | S[2] | | S | | S[2] | | S[2] | S[2] | S[2] | | | S[2] | S[2] | | X[2] | | | | | | | | X | X | X | | X | | | | | | | | ● | ● | | | | | ● | ● | | | | | | |
| ☠ BROMOXYNIL + MCPA ester[8] | 4,6 | | | S[2] | S[2] | S[2] | S[2] | | S[2] | S[2] | | | S[2] | | S[2] | S[2] | S[2] | S[2] | S[2] | S[2] | X | | | | | | | | | | X | X | X | | X | | | | | | | | ● | ● | | ● | | | ● | ● | | | ● | | | |
| — CLETHODIM | 1 | | | | | | | | | | | | | | | | | | | | | | S | | | | | | | | | X | | X | | ● | | ● | ● | S | ● | | | | | | | | | | | | | | | |
| ▽ CURTAIL M | 4 | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | X | X | X | | X | | | | | | | | | ● | | | | | | | ●g | | ●g | | | |
| ▽ DICAMBA + 2,4-D | 4 | | | S | S | S | S | | S | S | | | S | S | | | S | S | S | S | S | | | | | | | | | | X | | | | X | | | | | | | | | ● | ● | | | ● | ● | ● | | | ● | | | |
| — DICAMBA + MECOPROP + MCPA | 4 | | | X[9] | X[9] | X[9] | X[9] | E[9] | E[9] | X[9] | | | X[9] | E[9] | | | E[9] | E[9] | E[9] | E[9] | X[9] | E[9] | | | | | | | | | X | | X | | X | | | | | | | ☐ | | ● | | ● | | ● | ● | | | | ● | | | |
| — EDGE | 3 | | | | | | | | | | | | | | | | | | | | | | S[2] | | | | | | | | | | | X | | ● | | ● | ● | | ● | | | ● | | | ● | S | ● | | | | | | | |
| — EPTAM 8-E | 8 | | | | | | | | | | | | | | | | | | | | | | S[2] | | S[2] | | | S[2] | S[2] | | | | | | | ● | | ● | ● | | | | | | | | ● | | | | | | | | | |
| ▽ KERB | 15 | | | | | | | | | | | | | | | | | | | | | | X | | | | | | E | | | | | | | | ● | | | ● | ● | | | | | | ● | | | | | | | | | |
| ▽ LONTREL | 4 | | X | X | X | X | X | X | X | X | | | X | | X | X | X | X | X | X[6] | X | | | | | | | | | | X | X | X | X | X | | | | | | | | | ● | | | | | | | | | | | | |
| ◈ MCPA[8] | 4 | X[6] | | X[6] | X[6] | X[6] | X[6] | X[6] | X[6] | | | | X[6] | | X[6] | X[6] | X[6] | | | X[6] | X[6] | | S[5,6] | S[5] | | S[5] | | | | | X | X | X | | X | | | | | | | | ● | | ● | | | | | ● | | ● | ● | | ● | |
| ☠ MCPB + MCPA | 4 | | S[4] | S[4] | S[4] | S[4] | S[4] | | S[4] | | | S[4] | | S[4] | S[4] | S[4] | S[4] | S[4] | S[4] | S[4] | S[4] | S[4] | S[2,6] | S | | S | | | | S | X | | X | | X | | | | | | | ☐ | | | | | | | | | | ● | | | | |
| — ODYSSEY | 2 | | | | | | | | | | | | | | | | | | | | | | X[2] | | | | | | | | | | | | | ● | | ● | | | ● | | | S | | | ● | ● | | | | | ● | | | |
| ☠ PRESTIGE | 2,4 | | | X[2] | X[2] | X[2] | X[2] | | | | | | | | | | | | X[2] | | X[2] | | | | | | | | | | X | | | | X | | | | | | | | | ● | | | S | ● | | | ●g | | ●g | | | |
| ▽ POAST ULTRA | 1 | | | | X[2] | | | | | | | | | | | | | | | | | | X | X | X | | X | X | | | | X | | X | | ● | S | ● | ● | S | ● | | | | | | | | | | | | | | | |
| ▽ PRINCEP NINE-T/SIMAZINE | 5 | | | | | | | | | | | | | | | | | | | | | | E | | | | | | E | | | | | | | ● | | | ● | | ● | | | ● | | | | | | | | | | | | |
| — PURSUIT | 2 | | | | | | | | | | | | | | | | | | | | | | X[16] | | | | | | | | | | | X[11] | | | | S | | | | | | | | | | | | | | | | | | |
| — REFINE EXTRA TOSS-N-GO | 2 | | | X | X | X | X | E | | | | X | X | X | | | X | X | X | X | | X | | | | | | | | | X | | X | | X | | | | | | | | | ● | | | ● | S | ● | | | | ● | | | |
| — TRIFLURALIN[8] | 3 | | | | | | | | | | | | | | | | | | | | | | S[13] | S[14] | S[14] | S[14] | S[13] | S[12] | S[14] | | | X[7] | | X | | ● | | ● | ● | | ● | | | ● | | | ● | | ● | | | | | | | |
| ▽ VELPAR L | 5 | | | | | | | | | | | | | | | | | | | | | | E[2] | | | | | | | | | | | | | | | | | | | | | | | | | | | | ☐ | | | | | ● |
| ▽ VENTURE L | 1 | | | | X[2] | | | | | | | | | | | | | | | | | | X | | | X[4] | | | X[4] | | | X | | X | | ● | | ● | ● | | ● | | | | | | | | | | | | | | | |

Poison Hazard
See Safe Use of Herbicides, Fungicides and Insecticides Section in *2006 Guide to Crop Protection*

☠ Danger ◈ Warning ▽ Caution — No warning symbol required

**REFER TO THE 2006 GUIDE TO CROP PROTECTION AND PRODUCT LABELS FOR COMPLETE DETAILS**

## WEEDS

| BROADLEAF WEEDS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | VOLUNTEER CROPS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hemp-nettle** | Knotweed, Prostrate | Kochia | Lamb's-quarters | Lettuce, Prickly | **Mustard, Ball** | Mustard, Dog | Mustard, Hare's-ear | Mustard, Indian | Mustard, Tumble | **Mustard, Wild** | Mustard, Wormseed | Pigweed, Prostrate | Pigweed, Redroot | Pigweed, Russian | **Plantain, Common** | Purslane | Radish, Wild | Ragweed, Common | Ragweed, False | **Ragweed, Giant** | Russian thistle | Scentless Chamomile | Shepherd's Purse | Smartweed, Lady's Thumb | **Sow Thistle (Annual)** | Sow Thistle (Perennial) | Stinkweed | Sunflower, Prairie/Annual | Sweet Clover, White | **Thistle, Canada** | Cereal Grains (Wheat, Barley) | Cereal Grains (Oats) | Flax | Canola | Alsike Clover |
| | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ●g | ● | ● | □ | ●g | □ | ● | □ | | | | ● | |
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| S | | | ● | | ● | | | | | ● | ● | | ● | | ● | | S | ● | ● | ● | | | ● | | S | □ | ● | | | ● | | | | ● | |
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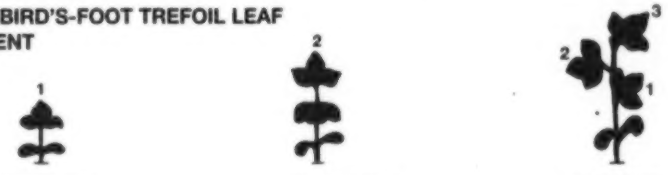
### NOTES: CROPS

1. Underseeded only.
2. For seed production only.
3. Seedlings for seed production only. Established for seed or forage.
4. Do not graze or harvest for livestock in the year of treatment.
5. Use MCPA sodium salt on seedling forages only when underseeded to flax, oats, wheat or barley. Do not use on Flemish varieties of alfalfa.
6. For use as a spot treatment only to control red bartsia.
7. Apply the fall prior to seeding.
8. Not all products registered for crops and weeds indicated. Check product labels.
9. For forage production only.
10. Check recommendations for varietal restrictions.
11. CLEARFIELD varieties only.
12. Liquid formulations in spring only.
13. Advance 10G, Bonanza 10G, Treflan E.C. (spring only), Treflan QR5 only.
14. Treflan E.C. in spring only.
15. Seed production only. Apply to seedling stands that will be in production for three years after application and established stands that will be in production for 2 years after application.
16. May not include solin. Check product label for restrictions.

### LEGEND: WEEDS

| | |
|---|---|
| ● | Controlled by rates recommended for crops. Where more than one brand is recommended, the weed may not appear on all labels. |
| □ | Top growth suppression only. |
| **S** | Suppression. |
| **a** | Will not control CLEARFIELD varieties. |
| **b** | Do not use the quackgrass rate in seedling sweet clover or seedling alsike clover. |
| **d** | Controlled by MCPAK only. |
| **e** | Controls volunteer wheat, suppresses volunteer barley. |
| **f** | Controls redroot pigweed only when a cereal cover crop is used. |
| **g** | Spring seedlings only. |
| **h** | Controlled only when growing rapidly. |

### STAGES OF BIRD'S-FOOT TREFOIL LEAF DEVELOPMENT



1 TRIFOLIATE

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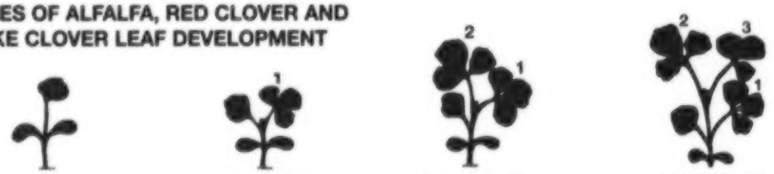
### STAGES OF ALFALFA, RED CLOVER AND ALSIKE CLOVER LEAF DEVELOPMENT



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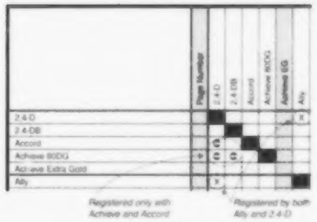
For information on pasture weed control, consult the "Weed Control in Pastures and Hayfields" table in the *2006 Guide to Crop Protection*.

# Pesticide Tank Mix Combinations

The tank mixes given on the product pages in the guide are limited to those listed on that product's label. The following chart is designed to allow the user to find all tank mix options available for a product.

To find mixes recommended on the product label, find the product of interest on the list to the left. Hits along that row correspond to tank mixes recommended by that product.

To find additional mixes that may be recommended by other products, find the product of interest in the top listing. Hits in that column will either be common recommendations or exclusive recommendations.


Page Number
2,4-D
2,4-DB
Accent
Achieve 80DG
Achieve Extra Gold
Ally
Registered only with Achieve and Accent
Registered by both Ally and 2,4-D

| | 2,4-D | 2,4-DB | Accent | Achieve Liquid | Ally | Assert | Assure II | Atrazine | Attain | Avadex | Avenge | Basagran/Basagran Forte* | Bromoxynil | Bromoxynil + 2,4-D | Bromoxynil+MCPA ester | Clethodim | Curtail M | Dicamba | Dicamba+mecoprop+MCPA | Dichlorprop/2,4-D | Dual II Magnum | DyVel | DyVel DSp | Eptam | Eradicane | Everest | Express Pack/Express TNG* | Frontline | Frontline 2,4-D | Fusion | Glyphosate | Horizon | Liberty | Linuron | Lontrel | MCPA | Mecoprop | Muster | Odyssey | Option | Pinnacle | Poast Ultra | Prestige | Primextra II Magnum | Puma$^{120}$ Super | Pursuit | Refine Extra | Reflex | Sencor | Spectrum | Trifluralin (liquid) | Triton C | Trophy | Ultim | Unity | **Fungicides** | Bravo | Manzate DF | Quadris | Tilt | **Insecticides** | Decis | Diazinon | Lorsban/Pyrinex | Malathion | Matador | Ripcord |
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| 2,4-D | ■ | | | | X | X | | | | | X | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | |
| 2,4-DB | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Achieve Liquid | € | € | | ■ | | | | | X | | | | X | X | X | | X | | | X | | | | | | | | | | | | | | | € | € | | | | | | | X | | | | | | | | | | X | | | | | | | | | € | | | | | |
| Achieve Liquid Gold | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | | | |
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| Amitrol | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assert | X | | | | | ■ | | | X | | | | | | | | X | | | X | | | | | | | X | X | | | | | | | | € | | | | | | | X | | € | | X | | | X | | | | | € | | | | | | | | | | | | |
| Assure II | | | | | X | | ■ | | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Atrazine | | | | | | | | ■ | | | | | X | | | | | € | | | X | | | | X | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Attain | | | | X | | X | | | ■ | | | | | | | | | | | | | | | | | X | | | | | | X | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | |
| Avadex (liquid formulations) | | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | |
| Avenge | X | € | | | X | | | | | | ■ | | X | X | X | | X | | | X | | | | | | | | | | | | | | | | X | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | |
| Basagran/Basagran Forte* | € | | | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| Bromoxynil* | € | | X | X | | | | X | | | X | | ■ | | | | | € | | | | | | | | | | | | | | X | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bromoxynil + 2,4-D | | | | X | | | | | | | X | | | ■ | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | |
| Bromoxynil+MCPA ester* | | | | X | € | | | € | | | X | | | | ■ | X | | | | | | | | | | X | | | | X | | X | | | | € | | | | | | X | | | X | | € | | | | | | | | | | | | | | | | | | | | |
| Clethodim | | | | | | | | | | | | | | | X | ■ | € | | | | | | | | | | | | | | | | X | | X | € | | € | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | |
| Curtail M | | | | X | | X | | | | | X | | | | | | ■ | | | | | | | | | X | | | | | | X | | | | | | | | | | | | | X | | X | | | | | | | | | | | | | | | | | | | | |
| Dicamba | X | | X | | € | | | | | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | X | | | | X | | | | | | | | | X | | | | | | | | | | | | | | | | | | |
| Dicamba+mecoprop+MCPA | | | | | | | | | | | | | | | | | | | ■ | | | | | | | X | | | | | | X | | € | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | |
| Dichlorprop/2,4-D* | | | | X | | X | | | | | X | | | | | | | | | ■ | | | | | | | | | | | | X | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | |
| Dual II Magnum | | | | | | | | X | | | | | | | | | | | | | ■ | | | | | | | | | | € | | | | | | | | | | | | | | | € | | | € | | | | | | | | | | | | | | | | | | |
| DyVel | | | | | | | | | | | | | | | | | | | | | | ■ | | | | X | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DyVel DSp | | | | | | | | € | | | | | | | | | | | | | | | ■ | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eptam | | | | | | | | | | | | | | | | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | |
| Eradicane | | | | | | | | X | | | | | | | | | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Escort | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Everest | € | | | | € | | | | X | | | | € | € | X | | X | | X | € | | X | X | | | ■ | € | X | X | | | | | | | € | | | | | | | X | | | | X | | | X | | | | | € | | | | | | | | | | | | |
| Express Pack / Express TNG* | € | | | | | X | | | | | | | | | | | | € | | | | | | | | | ■ | | | | X | | | | | €** | | | | | | | | | X | | | | €** | | | | | | | | | | | | | | | | | | |
| Frontline | | | | | | X | | | | | | | | | | | | | | | | | | | | X | | ■ | | | | € | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | |
| Frontline 2,4-D | | | | | | € | | | | | | | | | | | | | | | | | | | | X | | | ■ | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | |
| Fusion | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | ■ | | | X | | X | € | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Glyphosate* | € | | | | | | € | € | | | | | € | | € | | | € | | | | | | | | | X | | | | ■ | | | | X | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Harmony Total | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Horizon | € | | | | X | | | | X | | | | X | X | X | | X | | X | X | | X | | | | | | | | | | ■ | | | € | € | € | | | | | | X | | | | X | | | | | | X | | € | | | | | X | | € | | | | X | |
| K2 | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Liberty | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | X | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Linuron | | | | | | | | X | | | | | | | | | | | | | € | | | | | | | | | | | | | ■ | | X | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | |
| Lontrel | € | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | X | X | | | | ■ | € | | | X | | | X | | | | | X | | | | | | | | | | | | | | | | | | | | |
| MCPA | | | | | | | | | | | X | | X | | | | | X | | | | | | | | | | | | | | | | X | | ■ | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | |
| Muster | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | |
| Odyssey | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Option | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pinnacle | | | | | | | X | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Poast Ultra | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | € | | X | € | | X | | | | ■ | | | | € | | | | | | | | | | | | | | | | | | | | | |
| Prestige | | | | X | | X | | | | | | | | | | | | | | | | | | | | X | | | | | | X | | | | | | | | | | | ■ | | X | | | | | | | | | | | | | | | | | | | | | | |
| Puma$^{120}$ Super | € | | | | X | | | | X | | | | | X | X | | X | | | X | | € | € | | | | X | X | | | | | | | € | € | € | | | | | | X | | ■ | | X | | | X | | X | X | | X | | | | | | | | | | | | |
| Refine Extra | X | | | | | X | | | € | | | | | | | | X | € | | | | | | | | X | | | | | | X | | | X | € | | | | | | | | | X | | ■ | | | | | | | | | | | | | | | | | | | | |
| Refine M | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reflex | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| Sencor | € | | | | | | | | | | | | | | | | | X | X | | | | | € | | | | | | | | | | | | X | | | | | | | | | | | | | ■ | | X | | | | | | | | | | | | | | | | |
| Shotgun | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | |
| Spectrum | | | | | | X | | | | | | | | | | | | | | | | | | | | X | | | | | | € | | | | | | | | | | | | | X | | | | | ■ | | | | | | | | | | | | | | | | | |
| Sundance | € | | | | | | | | | | | | € | | € | | | | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Trifluralin (liquid) | | | | | | | | | | X | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | X | | ■ | | | | | | | | | | | | | | | | |
| Triton C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | ■ | | | | | | | | | | | | | | | |
| Trophy | | | | X | | € | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | X | | | | | | | | ■ | | | | | | | | | | | | | | |
| Unity | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | € | | | | | | | | | X | | | | | | | | | | ■ | | | | | | | | | | | | |
| Venture L | | € | | | € | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | € | | | € | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | |
| **Fungicides** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bravo | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | | X | | | | | | | | |
| Kocide 2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | | | | | | | |
| Polyram DF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | € | | |
| Propiconazole | € | | | | | | | | | | | | € | | € | | | | | | | | | | | | | | | | | X | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | € |
| Quadris | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | ■ | | | | | | | | |
| Ronilan EG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | |
| Stratego 250 EC | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | |
| **Insecticides** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Decis | € | | | | | | | | | | | | € | | € | | | € | | | | | | | | | | | | | | | | | | € | | | | | | | | | € | | | | | | | | | | | | | | | | | ■ | | | | | |
| Lorsban | € | | | | | | | | | | € | | | | € | | | € | | | | | | | | | | | | | | | | | | € | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | | | |
| Matador | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | € | | | | | | ■ | |

* Not all mixes registered with all products. See product page for details.

X Mix is recommended by both products.

€ Mix is recommended by the product on the left of the chart only.

** Only in the mix of Express TNG + Sencor/Evict + MCPA. 2,4-D not included.

## Weatheradio Canada

Weatheradio is a network of radio stations operated by the weather service of Environment Canada which transmits weather information continuously over VHF-FM radio. The service operates 24 hours each day, seven days a week, providing up-to-the minute weather forecasts and reports detailed to each broadcast area.

Weatheradio is transmitted from nine locations in Saskatchewan:

- Prince Albert, Stranraer, Regina Beach, Lanigan, Lloydminster and Midale on frequency 162.400;
- Regina, Swift Current, Yorkton and Saskatoon at 162.550; and
- North Battleford, Lake Diefenbaker and Whitewood at 162.475.
- Medicine Hat at 162.550 can also be received west of Maple Creek.

## Meteorological Service of Canada

| | |
|---|---|
| General Inquiries (Saskatoon) | (306) 975-4264 |
| **Weather Information** | |
| Broadview | (306) 696-2229 |
| Estevan | (306) 634-2833 |
| Hudson Bay | (306) 865-2721 |
| Lanigan | (306) 365-3011 |
| Lloydminster | (780) 875-7709 |
| Medicine Hat, AB | (403) 526-0483 |
| North Battleford | (306) 445-7000 |
| Prince Albert | (306) 929-2114 |
| Regina | (306) 780-5744 |
| Saskatoon | (306) 975-4266 |
| Swift Current | (306) 773-5599 |
| Whitewood | (306) 735-2928 |
| Yorkton | (306) 782-1511 |
| **Severe Weather Reporting and Weather Awareness** | |
| Call No Charge | 1-800-239-0484 |

The **Crop Protection Planner**, a Windows-based computer program, is available to accompany this publication. The Planner will help you in making quick, accurate decisions about chemical pest control options. Access to an IBM-compatible computer is required.

For the current pricing or further details on this software, contact the U-Learn Centre at the University of Saskatchewan:

**Phone:** (306) 966-5565
**Fax:** (306) 966-5567
**Website:** www.extension.usask.ca
Look for the link under non-credit agriculture courses.

***The Pest Control Products (Saskatchewan) Act*** and Regulations to that Act require that any person who applies a pesticide for commercial purposes must have a valid applicator's licence.

To be eligible for a licence, appropriate training is required from the Agriculture Division of SIAST:

**Phone:** 1-800-667-7730

Further details regarding licensing requirements can be obtained from the Inspection and Regulatory Management Branch of Saskatchewan Agriculture and Food:

**Phone:** (306) 787-4662

## Crop Protection Companies

**Ag West Inc.**
1-403-938-4849

**Arysta LifeScience**
www.arysta-na.ca
1-866-761-9397

**BASF**
www.agsolutions.ca
1-877-371-2273

**Bayer CropScience**
www.bayercropscience.ca
1-888-283-6847

**Cheminova**
www.cheminova.com
1-888-316-6260

**Degesch America Inc.**
www.degeschamerica.com
1-800-330-2525

**Dow AgroSciences**
www.dowagro.ca
1-800-667-3852

**E.I. Dupont Canada**
www.dupont.ca/ag
1-800-667-3925

**Engage Agro**
www.engageagro.com
1-800-900-5487

**Gowan Canada**
www.gowanco.com
1-800-883-1844 ext.2

**Hedley Technologies**
www.hedleytech.com
1-888-476-4473

**IPCO**
**www.ipco.ca**
1-204-233-3461

**Monsanto**
www.monsanto.ca
1-800-667-4944

**Norac Concepts**
www.noracconcepts.com
1-613-841-2907

**Nufarm Agriculture**
www.nufarm.ca
1-800-868-5444

**Peacock Industries**
www.grasshoppercontrol.com
1-306-225-4691

**Syngenta Crop Production**
www.syngenta.ca
1-800-665-9250

**United Agri Products**
www.uap.ca
1-800-561-5444

**Valent BioSciences**
www.valent.com
1-800-898-2536

# HERBICIDE ROTATION - 2006

To delay the onset of resistance, include herbicides from as many different herbicide groups as possible for each weed. Refer to page 27 for more information.

## ROTATION GRASS HERBICIDES

**GROUP 1**
Achieve, Assure II, Clethodim, FlaxMax*, Fusion, Horizon,Odyssey DLX*, Poast Ultra, Puma$^{120}$ Super, Venture

**GROUP 11**
Amitrole

**GROUP 2**
Accent, Adrenalin*, Assert, Everest, Odyssey, Odyssey DLX*, Pursuit, Solo, Sundance

**GROUP 10**
Liberty

**GROUP 3**
Edge, Fortress*, Trifluralin

**GROUP 8**
Avadex, Avenge, Eptam, Eradicane, Fortress*

**GROUP 9**
Eclipse*, Glyphosate, PrePass*, Rustler*

## ROTATION BROADLEAF HERBICIDES

**GROUP 2**
Adrenalin*, Ally, Assert (Wild Mustard), Express Pack*, Frontline*, Muster, Odyssey, Odyssey DLX*, Pinnacle, Prism, PrePass*, Pursuit, Refine Extra, Solo, Spectrum*, Sundance, Unity*

**GROUP 3**
Edge, Trifluralin

**GROUP 11**
Amitrole

**GROUP 4**
2,4-D, 2,4-DB, Adrenalin*, Attain, bromoxynil + 2,4-D ester*, bromoxynil+MCPA ester*, Curtail M, dicamba, dicamba+mecoprop+MCPA, dichlorprop+2,4-D, Dyvel, Dyvel DSp, Eclipse*, Express Pack*, FlaxMax*, Frontline*, Lontrel, MCPA, MCPB+MCPA, Prestige, Rustler*, Shotgun*, Spectrum*, Trophy, and mixes containing these active ingredients

**GROUP 10**
Liberty

**GROUP 9**
Eclipse*, Glyphosate, PrePass*, Rustler*

**GROUP 8**
Eptam, Eradicane

**GROUP 5**
Atrazine, Laddok*, Sencor, Shotgun*, Simazine

**GROUP 6**
Basagran, bromoxynil, bromoxynil + 2,4-D ester*, bromoxynil + MCPA ester*, Laddok*, Unity*

**GROUP 7**
Linuron

* Some products contain more than one active ingredient and therefore may appear in more than one group.

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